

Ray Bradbury Arthur C. Clarke Robert Chilson

Galileo

MAGAZINE OF SCIENCE & FICTION



Number One

\$1.50

DOUBLEDAY

The Biggest Hardcover Publisher Of Science Fiction Presents

- | | |
|--|--|
| <p><input type="checkbox"/> IRRATIONAL NUMBERS \$5.95
George Alec Effinger</p> <p><input type="checkbox"/> THE EARLY POHL \$5.95
Frederik Pohl</p> <p><input type="checkbox"/> ARENA: SPORTS SF \$5.95
Edited by Edward Ferman and
Barry Malzberg</p> <p><input type="checkbox"/> UNIVERSE 6 \$5.95
Edited by Terry Carr</p> <p><input type="checkbox"/> THE SEIGE OF WONDER \$5.95
Mark Geston</p> <p><input type="checkbox"/> SPACE ODYSSEYS \$7.95
Edited by Brian Aldiss</p> <p><input type="checkbox"/> THE HAND OF DBERON \$5.95
Roger Zelazny</p> <p><input type="checkbox"/> PATTERNMASTER \$5.95
Octavia E. Butler</p> <p><input type="checkbox"/> ND BROTHER, NO FRIENDS \$5.95
Richard Meredith</p> <p><input type="checkbox"/> TIME DF THE FOURTH HORSE-
MAN \$5.95
Chelsea Quinn Yarbro</p> <p><input type="checkbox"/> THE BEST FROM THE REST OF
THE WORLD \$6.95
European SF Edited by Donald A.
Wollheim</p> | <p><input type="checkbox"/> KINGDOMS OF SDRcery \$6.95
Edited by Lin Carter</p> <p><input type="checkbox"/> THE GRAYSPACE BEAST \$5.95
Gordon Eklund</p> <p><input type="checkbox"/> THE LITANY OF SH'REEV \$5.95
William Jon Watkins & Gene
Snyder</p> <p><input type="checkbox"/> THE BICENTENNIAL MAN And
Other Stories \$5.95
Isaac Asimov</p> <p><input type="checkbox"/> A GALAXY OF STRANGERS
Lloyd Biggle, Jr. \$5.95</p> <p><input type="checkbox"/> REALMS OF WIZARDRY \$7.95
Edited by Lin Carter</p> <p><input type="checkbox"/> DOWN HERE IN THE DREAM
QUARTER \$5.95
Barry Malzberg</p> <p><input type="checkbox"/> THE EARLY LONG \$7.95
Frank Belknap Long</p> <p><input type="checkbox"/> HEALER \$5.95
F. Paul Wilson</p> <p><input type="checkbox"/> DEUS IRAE \$5.95
Philip K. Dick and Roger Zelazny</p> <p><input type="checkbox"/> BEASTS \$5.95
John Crowley</p> |
|--|--|

Available through your local bookstore
Or send your check directly to:

Doubleday & Company, Inc.
Dept. ZA-631
Garden City, New York 11535

Prices subject to change
New York Residents please add sales tax

THE BEST OF THE FUTURE AVAILABLE NOW...



**BRADBURY
CLARKE
CLEMENT
& MORE!**

There is a new direction in the field of Science Fiction. The early period, the time of Gernsback, Burroughs, and robots, gave way to the middle period of interstellar travel, Russell, and Campbell. Now the new wave of authors, led by the most farsighted of the 'old timers', are taking Science Fiction into its young adulthood. Experimentation is now mixed creatively with the tested craftsmanship of the masters. The great work of the past is now the foundation of the future. The best is yet to come, and GALILEO is where you'll find it.

GALILEO is a new science fiction quarterly (destined to be monthly) which will be available only through subscription and a few selected bookshops around the country. Its cost, at \$1.50, will reflect the quality of its contents in design, illustration, and most importantly, writing. (Subscribers will, of course, benefit from a reduced cost per copy). The great names we proudly announce on our covers are symbols of the fine works by authors both new and established which we will gather together for each voyage to the stars. An outstanding crew in every issue.

Our intention in publishing GALILEO is to pick up where editors like John W. Campbell left off. Science Fiction is—or should be—quality entertainment AND literature. It is the most important literature of our time, or any time. . . . History teaches, science leads. Our GALILEO offers a vision of mankind's future through the eyes of the poet and the scientist. There can be no true appreciation of the present, or the past, without the perspective of the future.

Science and theory are the raw materials, . . . what mankind might do with them is Science Fiction. GALILEO is the quality Science Fiction magazine, the best of the future, available now!

This is one voyage I don't want to miss. Sign me up for the special subscription rate I have checked below. My check is enclosed.

4 issues at \$4. (saving \$2.) 10 issues \$9. (saving \$6.)

Name: _____

Street: _____ Town: _____

State: _____ Zip: _____

Send to: GALILEO, 339 Newbury Street, Boston, MA 02115

First issue premiere
September 2, 1976

Contents

Arthur C. Clarke, Ray Bradbury,
a young woman being led astray,
and a revealing cover-up. . .
All in this issue!



Science

COMMUNICATIONS IN THE SECOND CENTURY OF THE TELEPHONE

by Arthur C. Clarke 16
If you think all you can get on the phone now is a recording, take a look at what Mr. Clarke predicts for the next 100 years.

MARVELS AND MIRACLES— PASS IT ON! An Interview by Ray Bradbury. 12

Men need challenges, mountains to climb, stars to reach, and it's up to science fiction writers to provide them, according to Jules Verne.

ASHES TO ASHES, RUST TO RUST. Or, the Robot in Science Fiction. By Peter Weston. . . . 10

How many good robot stories have you read? Not many, says our columnist, the robot is still an SF tinker toy.

Short Stories

DREAMS OF ASH, MEMORIES OF FIRE by Karl Hansen. 22

It was a fair trade. The robots gave him what he needed in return for freeing 1000 of the metal slaves. But each gave the other a little more than they had bargained for.

THE TAME ONE by Robert Chilson. 29

The animals are untamable. That was a fact. Yet, why did Myrna seem so friendly? . . .

BLANKET COVERAGE by Walter Pilcher. 35

What do four electric blankets, and four couples and a bedroom bring to mind? . . . You're wrong! Read on.

Short Stories

The SNARES of the HUNTER by Michael Stall. 40

It seemed the perfect plan, but. . . Now he had to find a way out of it; escape from a solar system designed to trap all who entered.

NEXT DOOR NEIGHBOR by Kevin O'Donnell, Jr. 47

Living alone can be a terrible burden. Sometimes a family down the hall can fill the void, . . . or perhaps replace it with another.

DRACONIAN INHERITANCE by Ruth Berman. 62

Her job was to capture criminals, but the one she caught this time seemed to have a unique form of revenge.

Novellette

GROWING UP

by **Damien Broderick** 53

How does one choose between two illusions? Sriyanic faces this difficult choice *growing up* among the Cyborgs in a desolate future where reality is a product of the mind.

Departments

THE ALEPH: A Seasonal Micro-

cosm by **Andrew A. Whyte** . . . 70

You'd think a science fiction magazine would review books that haven't been published yet. . . Well, that's exactly what Drew Whyte does.

The AUTHORS 6

The stars that are with us.

CLASSIFIEDS 80

from bazaar to bizarre.

EDITORIAL

by **Charles C. Ryan** 8

Who goes there? . . . And Why?

THE INQUISITION 78

Letters already?

TELESCOPE 79

What's up and coming in future issues.

LIST OF ADVERTISERS

Berkley	4 & 5
Creative Computing	73
Doubleday	FC
Fiction Magazine	75
Galaxy	15
Galileo	1
Poster Shop	76
Starstream	9

Department

The PHOTOGALLERY

by **Charles C. Ryan** 81

It is hard to believe that the author of *Tas Zero*, *The Broken Sword*, and *Fire Time*, will mark his first half century this year. Many of us remember when Poul Anderson was the new star in the firmament. Since that time the Pennsylvania born, Minnesota raised, California Bay Area resident has chalked up more awards than we can mention, including multiple Hugo's and Nebula's. His outstanding literary talents in and out of Science Fiction, his generosity, and his dedication are now legend. We look forward in great expectation to his second fifty.

Photograph taken at the 1976 Boskone where Mr. Anderson was guest of honor.

NOTE: We hope that the full page photo on our inside back cover will be a regular feature; a fan's delight, offered as a tribute to the men and women who are busily creating our future. Submissions are welcome, but should be accompanied by a self-addressed and stamped envelope for return if not accepted. Payment is \$20.

ABOUT THE FRONT COVER

Tom Barber is a newcomer to science fiction illustration, however his work not only shows the experience of many years study, but a natural feeling for the SF milieu. Here his assignment was the keynote of our new effort with a visual compliment to our namesake.

Title: "The Starry Messenger"

ABOUT THE BACK COVER

"The Spectre" is the title of our back cover illustration. As such, it is the antithesis of our front cover, "The Starry Messenger." The illustrations taken together, both painted by Tom Barber, combine to present an eternal conflict. The struggle for knowledge is often an acceptance of fear without submitting to it; a recognition of ignorance without forsaking knowledge. The Spectre of Ignorance, personified by the Inquisition, was Galileo's nemesis.

SPECIAL SALE! "The Spectre" will be sold for \$600 or the best offer received before December 1st, 1976. Bids may be sent to AVH attn: 'Art Sale'



GALILEO/ magazine of science & fiction, is published by Avenue Victor Hugo Publishers at 339 Newbury Street, Boston, Massachusetts 02115. Single copy price \$1.50. Subscriptions \$4 for 4 issues, \$9 for 10 issues. All stories, characters, and settings contained in stories are purely fiction. The factual accuracy of non-fiction articles is the responsibility of the author. No responsibility is assumed for unsolicited manuscripts. However, all submissions are welcome. No query is necessary. Acknowledgement will be made as soon as our small staff can get to them. Unsolicited material will be returned only if accompanied by a self addressed and properly stamped envelope. We welcome new authors. Payment base: one cent per word.

STAFF:

- EDITOR: Charles C. Ryan
- PUBLISHER: Vincent McCaffrey
- ASSISTANT EDITOR: Thomas Owen
- ASSISTANT PUBLISHER: Thais Coburn
- CONTRIBUTING EDITORS: William H. Desmond, Andrew A. Whyte
- PRODUCTION: Luanne Hendricks, Priscilla Fladger, Jessica Brilliant, Lorraine Watkins Shea, Alan J. Levine
- ART WORK: Doug Smith, Ron Miller, Wendi Pini, John McIntosh, John King, Pat Warrick, Tom Barber

Copyright © 1976 by Avenue Victor Hugo

Meet Some of the Brightest Stars



PHILIP JOSÉ Farmer

Author of
the widely-acclaimed
RIVERWORLD
SERIES

"This frantic, funny fantasy takes us on a wild romp across a planet populated by resurrected people from all centuries and countries."

—Publishers Weekly

TO YOUR SCATTERED BODIES GO

Winner of the 1972 Hugo Award for Best Science Fiction Novel of the Year. \$1.50

THE FABULOUS RIVERBOAT

"Battles, intrigues, metaphysics. ...Clever, fast-moving, and really different."

—Publishers Weekly. \$1.25

Also by Philip José Farmer:

NIGHT OF LIGHT 75¢



CLIFFORD D. Simak

Author of
SHAKESPEARE'S
PLANET

"A solid adventure by an excellent storyteller."—*The Booklist*. The spellbinding tale of what happens when, after 1,000 years in space, an explorer ship finally locates a planet man can inhabit.

Just Published/\$6.95

A CHOICE OF GODS

"Original and ingenious."
—Publishers Weekly. 75¢

ENCHANTED PILGRIMAGE

"Fantastic adventure with a touch of romance...entertaining fare."—*The Booklist*. \$1.25

DESTINY DOLL

One of Hugo Award-winner Simak's "most delightful books...a bizarre adventure, full of action, color, and suspense."
—*Luna Magazine*. \$1.25

THE GOBLIN RESERVATION 75¢

OUT OF THEIR MINDS

\$1.25



ALFRED Bester

Author of
THE LIGHT
FANTASTIC

The Great Short Fiction of Alfred Bester: Vol. I

"His headnotes on each story, with candid and witty comments on his own work and the SF industry are almost as good reading as the stories themselves."

—Publishers Weekly.

Just Published/\$7.95

STAR LIGHT, STAR BRIGHT

The Great Short Fiction of Alfred Bester: Vol. II

Ready in September/\$7.95

THE COMPUTER CONNECTION

Bester's first full-length SF novel in 19 years. "Mind-stretching entertainment."

—Cleveland Plain Dealer. \$1.50

THE STARS MY DESTINATION

"Considered by many readers and writers to be the greatest single SF novel."

—SAMUEL R. DELANY. \$1.25

in Berkley's Science Fiction Galaxy



Science Photography

ROBERT A. Heinlein

"One of the brightest names in science fiction, four-time winner of the Hugo Award."—*Boston Globe*

Author of such classics as:

STRANGER IN A STRANGE LAND

2,500,000 copies sold to date! The dazzling underground best-seller that added "Grok" to our vocabulary. \$1.95

TIME ENOUGH FOR LOVE

"A great entertainment.... Heinlein is a master of beguilement."—*N. Y. Times*. "Compulsory reading... by a giant in the field."—*Library Journal*. \$1.95

I WILL FEAR NO EVIL \$1.95

TOMORROW THE STARS \$1.25

THE UNPLEASANT PROFESSION OF JONATHAN HOAG \$1.50

PODKAYNE OF MARS \$1.25

THE PAST THROUGH TOMORROW \$1.95

THE MOON IS A HARSH MISTRESS \$1.50

ORPHANS OF THE SKY \$1.25

GLORY ROAD \$1.75

FARNHAM'S FREEHOLD \$1.75

STARSHIP TROOPERS \$1.50



© Phil H. Webber

FRANK Herbert

Author of the dazzling
DUNE TRILOGY

The final DUNE novel—
a runaway national best-seller!

CHILDREN OF DUNE

"One of the hottest science fiction sellers of the year."
—*Hartford Courant*. "Absorbing equally for its action and its philosophic vistas."—*Washington Post Book World*. "Eagerly awaited by a coterie far beyond science fiction fandom."—*The Booklist*. Just Published/\$8.95

DUNE

Winner of the Hugo and Nebula Awards. "A science fiction classic."—*DAMON KNIGHT*. \$1.95

DUNE MESSIAH

"A worthy successor to *Dune*... with considerable excitement."—*Publishers Weekly*. \$1.50

Also by Frank Herbert:

DESTINATION VOID 95¢

THE SANTAROGA BARRIER 95¢

THE EYES OF HEISENBERG 95¢

WHIPPING STAR \$1.50

THE GODMAKERS \$1.25

Authors



Top row: Michael Stall, Kevin O'Donnell, Jr., Damien Broderick. Bottom Row: Karl Hansen, Peter Weston, and Robert Chilson.

Little introduction is needed for **Arthur C. Clarke**. Such is his popularity that *Imperial Earth*, his Tricentennial novel, has already sold 10,000 copies and gone to a second hardback printing. Clarke makes his home on the island of Sri Lanka (Ceylon), a location that allows him a certain degree of privacy and full opportunity to indulge in his favorite hobby, undersea exploration. While working some of the bugs out of the first radar units used during WWII, Clarke conceived the idea of using three satellites in stationary orbit as a means of providing instant, world-wide communications. Hence, he was the most logical choice when AT&T and MIT sought a guest speaker to celebrate the 100th anniversary of the telephone. GALILEO has the privilege of presenting his speech in its entirety.

A time machine provided the means for the illustrious **Ray Bradbury** to travel back in time to France and interview Jules Verne. Considered by many to be the most 'literary' science fiction author, Bradbury is also unabashedly a proponent of the "sense of wonder" in SF. A resident of Los Angeles, California, Bradbury says he has been writing

an average of one short story a week for the last 39 years and was one of the first authors to help increase the scope of SF beyond the traditional "nuts and bolts" approach. As much at home with fantasy as SF, his delightful novel *Something Wicked This Way Comes* is under option with Paramount Pictures and may soon go into production.

Melbourne, Australia-born **Damien Broderick** exhibits a complex prose style in his work which may serve as a base of comparison with writers the like of James Joyce and Thomas Pynchon. The eldest of six, Broderick is the product of a "pious/strangled Catholic upbringing" that culminated in two years in a junior seminary before being "driven forth from thence... by the scourge of inveterate masturbation and a hunger for the sane life." He has written for newspapers, freelanced, edited a men's magazine and was "fired for reasons of taste," and is presently polishing off a book on recent parapsychological research as well as completing work on a novel, *The Judas Mandala*, of which "Growing Up" is an excerpt. He has previously published a short story anthology in Australia and a sword & sorcery novel in the U.S.

Recent appearances in *Analog* and *Galaxy* serve as an excellent springboard for author **Kevin O'Donnell, Jr.**, who is *not* an alias for Harlan Ellison. Presently in the midst of writing his first novel, O'Donnell considers Ross MacDonald, Agatha Christie and Roger Zelazny as his favorite authors. Born in Cleveland, Ohio, the Yale grad presently resides in New Haven. He has lived in Korea, Taiwan, and Hong Kong among other places and speaks several "strategic languages."

John Campbell began **Robert Chilson's** career with the publication of his first story in *Analog* in 1968. Since that time he has published many short stories and three novels, the latest being *The Shores of Kansas*. Comics, the radio serial *Tom Corbett, Space Cadet*, and a few copies of *Astounding* and *Amazing* served to draw Chilson into the world of SF. Of himself Chilson says, "My taste is old-fashioned. I like stories. I like SF. I like ideas. I like new and different and gauzy worlds, Robert A. Heinlein, Jack Vance, Larry Niven, Hal Clement, and James H. Schmitz." Born in Ringwood, Oklahoma in 1945, Chilson was steeped in "folk wisdom" during his youth and

quotes his father "all the time, quite unconsciously."

A science fiction enthusiast for 20 years, **Peter Weston** has turned that background into a successful series of articles on the field. His column was formerly carried by the late British *Science Fiction Monthly*. His appearance in GALILEO marks the debut of the column in the U.S., though it is also being carried by magazines in France, Germany, and Italy. Born in 1944, Weston is a marketing manager in the heavy engineering industry. His amateur discussion magazine, *Speculation* was five times nominated for a Hugo award before the arrival of his first child caused its temporary abandonment. He hopes to chair the 1979 World SF Convention in Brighton.

Research on the use of viruses to transfer genetic material from one cell to another provides the basis of **Karl Hansen's** story in this issue. A physician-researcher, Hansen nonetheless finds time for writing, trout fishing, skiing and nature photography. Born in Salt Lake City, Utah, he spent most of his growing years in Colorado and now resides in Denver. Hemingway, Paul Bowles, Cordwainer Smith and Samuel R. Delany are among Hansen's favor-

ite authors and his first novel, *Black-Winged Night*, is presently under way.

A native of Washington, D.C., **Walter Pilcher's** accomplishments "include measuring Chain Bridge over the Potomac River with toilet paper." In his market management career he has been involved with such products as Metreel and L'eggs pantyhose. Of himself he says, "I write to entertain, and if I have any central thesis, it is that we are really at our most ridiculous when we take ourselves too seriously"...amply demonstrated in his story in GALILEO. Born in 1941, he is married and has three children.

Michael Stall has sold stories and short novels in England and on the Continent and is currently working on a novel, *Mistice*. Though he is a writer by profession, Stall has also been employed as a chemist, shipping executive and sold road rollers. "Snares of the Hunter" marks his first appearance in an American magazine.

Drew Whyte makes lists. He does not know when to stop. He is not working on a novel called *Orphan going Home* but he likes the title. There are many things he could do, if he could only find the time. Anyone with spare time is requested to send it to

Drew at the AVH address. He will be grateful. Recently, he returned from England where he spent many hours in the inspection of *Alepb's* in prominent British cellars. He was extremely well treated but emerged somewhat disappointed. Everybody else's universe is the same.

Both Drew Whyte and Peter Weston will be with us as regulars.

And finally there is the taciturn native of Kentucky and Minnesota, **Ruth Berman** who started writing at "5, 15, or 25." Active in amateur publishing, she attended the University of Minnesota and the University of California at Berkeley where she majored in English and day dreaming. We 'dunno' much more.

*

ODYSSEY
PUBLICATIONS
P.O. BOX 71 ARLINGHAM HIGHLAND, MA. 06177



OP-3

\$4.50 ea
postpaid

THE GOODS

ALL the *Exotic Adventures*, the *Spicy Mystery* combined with the *Blond and Thunder* of the PULP magazines of yore are recaptured in their Four-Color paperback glory in a very special reprint series from ODYSSEY PUBLICATIONS. Catalogs are issued on request.

«»

\$4.50 ea
postpaid

ODYSSEY
PUBLICATIONS
P.O. BOX 71 ARLINGHAM HIGHLAND, MA. 06177



OP-7

Charles C. Ryan

Editorial

"The Starry Messenger"

The destiny of the human race is not restricted to the planet Earth. It is to this idea that GALILEO magazine is dedicated. We endorse and support the concept that humankind can, and will, mature to the point where it will reach out and conquer the stars.

In *The Ascent of Man* Jacob Bronowski describes Galileo Galilei as a short square active man with red hair, a man who had "rather more children than a bachelor should have." While I am sure Bronowski was quite literal in his meaning, it is also true in the symbolic sense.

Neil Armstrong stepped from the Eagle to walk on the once mysterious face of the moon. Pioneer 10 is now outward bound with man's first message to the stars. Viking I has revealed with exceptional clarity that Mars is truly the Red Planet. All of these achievements are the children of Galileo. The scientific spirit he embodied was not crushed by the Inquisition.

For our first cover we asked artist Tom Barber to capture that spirit of the great man of Pisia. His illustration portrays Galileo as "The Starry Messenger," based on the work of the

same name published by the scientist in 1610. There was a reason for this choice. As much as humanly possible, I and the rest of the magazine's staff, will dedicate ourselves toward making this publication a vessel for that indomitable spirit, that undying quest for knowledge and sense of wonder that motivates all scientists, all honest seekers of truth.

Today and tomorrow's technology—though much maligned by the shortsighted—is very much a product of man's quests. The mechanical marvels spawned by it are an extension of the brain, an extrapolation of hands not readily submissive to biological restrictions. Galileo knew this. His work with the telescope allowed his eyes to go where his feet could not take him, to learn, to satisfy the need to know.

And yet, though every gram a scientist, Galileo was also very much a man, human, infused with strengths and weaknesses that allowed him to joke, to fear, to love. His scientific or technological side was inextricably fused with his humanity. The two have and always will go hand in hand. With full respect for the magazine's namesake, I intend to see *GALILEO* reflect and

intensify that duality of being. I want stories that encompass that Pisan's sense of wonder and Shakespeare's sense of story.

It was no coincidence, I believe, that Galileo and Shakespeare were brought forth from the womb in the same year, 1564. Both were creative giants in their fields. Both, certainly, kindled the flame of wonder. That spark of science and literature will burn brightly in the pages of *GALILEO*. I would like the magazine to become the place storytellers and artists think of first for their very best work.

All this is, of course, an ambition that will require time and care and much sweat of brow. It is something I ask you, the writers, illustrators, and readers of science fiction to join in. Send us your work, give us your ideas, your comments. Ask your local book stores and newsstands to carry *GALILEO*. Subscribe yourself. . . I'll be frank. We need your help, stories, art work, advice. And we need a great deal of it if *GALILEO* is to survive: if it is to succeed.

Before closing I must offer my deep appreciation to those who have already **Editorial—cont. on page 79**



STARSTREAM

COMING
AUGUST
1st

79¢

First time ever in comic form—the best in science fiction authors:

“Who Goes There” by John W. Campbell
The ultimate story of alien invasions.

“Does a Bee Care?” by Issac Asimov
The chief engineer designed the ship down to the last detail. But it held a secret even he could not know!

“Microcosmic God” by Theodore Sturgeon
Scientist creates a new race.

“Call Me Joe” by Paul Anderson
A strange symbiosis existed between the Jovian colonist and his human controller. But which was really the master?

Plus many more in each of the four 64-page chronicles. Each a must for every sci-fi buff's collection.

Starstream is available in a handy free 144 copy (4 x 36) floor display.



Asmt.
No. 7185
Retail
Value
\$113.76

STAR TREK

COMING
JULY
4th

\$1.95

224 pages full of Star Trek—the Enterprise Logs as depicted in the original comics #1-8. These original comics are now collector's items. This will be too. Trekkies will thank you for stocking and showing this big comic special.

The \$1.95 Star Trek is available in an exciting free 12-copy counter merchandiser.



Golden Press

Asmt. No. 55296
Retail Value \$23.40

ORDER NOW
to assure yourself a summer of Science Fiction sales. Call your distributor or send in this coupon to:

Western Publishing Company, Inc.
Dept. SF, 1220 Mound Ave.
Racine, Wis. 53404

YES, I am interested in what Western Science Fiction merchandisers can do for me. Have your representative call.

Name _____ Title _____

Firm _____

Address _____ Phone (____) _____

City _____ State _____ Zip _____

Peter Weston

Ashes To Ashes, Rust To Rust

The Robot In Science Fiction



CLANK-CLANK-CLANK!
How many times have the ponderous footsteps of robots lurched through the pages of science fiction magazines over the years? What great stories have been written about these metal servants to mankind?

Surprisingly few, actually! For the importance of the robot theme has been grossly overestimated both within and outside science fiction. Robots represent one of the worst cliché elements of the field, about on a par these days with stories of Adam & Eve or of Atlantis. Just as 'blaster' corresponds to 'sixgun' in pulp SF, so 'robot' is synonymous with a sort of latter-day Gunga Din.

Hold on there!, you cry.
What about Asimov's Robots? What about... and there you may start to scratch your head and ponder. For of the major writers in our field, Clarke has used an orthodox robot precisely once (in *City and the Stars*), Heinlein never, Blish never, Pohl, Anderson, Niven—never. And so the list goes on, although there are any number of *bad* robot stories.

My general thesis stands, although
10 GALILEO

with some honourable exceptions. And, widening our scope, some truly outstanding tales have been woven around the closely-related themes of artificial intelligence or of human personality transferred into artificial bodies.

So let's take a closer look at some of those robots in science fiction...

THE WORD ITSELF is just over fifty years old. It gained popular currency following a story and play called "Rossum's Universal Robots" by Karel Capek and derives from the Czech term for 'worker'.

Naturally the concept was readily adopted by the early pulp writers. It was made to measure for "Amazing" and "Astounding" and all the rest, with all sorts of plot possibilities which were exploited to the hilt. Robots running amok, enslaving humans, eventually taking over the world and replacing man. Only slightly less naive were second-generation stories which saw the poor robot as a sympathetic character, unjustly persecuted and misunderstood. Or in Asimov's "Death Sentence" (1943) in which—wait for it—humanity itself is revealed to be a superior type of

self-maintaining, self-propagating fleshy robot.

Somehow the whole theme appealed to an ages-old obsession with the artificial creation of life which had previously found expression in Mary Shelley's *Frankenstein* and can be traced back through the various medieval golems and homunculi and to Roger Bacon's famous speaking head in the thirteenth century. But not until John Campbell began his crusade to put the Science back into science fiction was there any real attempt to look at the robot as a serious technological development and to consider the implications of its use.

Back in the real world for the moment, there are still, despite Asimov's popularising, little prospects for the anthropomorphic, walking talking imitation (but far less versatile and far more costly) human being. Build an artificial man? What a quaint idea! Why should anyone want to bother when there is such a cheap, easy, and well-proven way of making the real thing!

Yet even as I write this article I am looking at an item in "New Scientist" for 18 September 1975 which estimates the European market for advanced industrial robots at \$4400 million.

Ashes/Rust

lion by 1985. If that is not a for-real example of science fiction coming true, what is?

Define your terms!

The journal is talking about "programmable, memory-controlled machines with several degrees of freedom of movement". Just glorified spanners, in other words, tools, able to do only the simplest and most repetitious jobs and purpose-designed for their function. The Cincinnati 'Unimate' for instance is basically a box with a swivelling metal arm sticking out of the side. It's hard to imagine them taking over the world!

Ah yes, but aren't these just primitive beginnings?

Certainly. But will they ever evolve to the state of R. Daneel Olivaw? I doubt it. Let me explain why I think not.

Take a case in point. In Asimov's "Reason" we have a space station manned by anthropoid robots, busily engaged in fetching and carrying, trundling about on their two legs to adjust controls, twiddle verniers and so forth. About the same time Arthur C. Clarke conceived the idea of a TV-relay satellite in synchronous orbit, run by crews of technicians to throw relays and supervise huge banks of vacuum tubes. Both were good, 1940s' concepts.

What do we have, now, in 1976? We have the electronic miracles of Early Bird and Syncom that can fit inside a minicar and yet automatically handle a thousand communications channels. And when we come to Asimov's solar power satellites the same thing will apply; far better to build a self-controlled machine rather than an artificial man.

FROM THE DEARTH of serious SF stories about robots I suggest that most authors tend to agree with me. Only quite rarely do we find any really original or meaningful insight into the place of robots. Let us take for example Martin Greenberg's 1953 collection, *The Robot and the Man*, containing tales by various authors which purported to trace the development of robots from the present-day into the far distant future.

The earlier stories are by far the best. Bernard Wolfe's "Self Portrait" has hardly dated at all, and reminds us that far from being able to build a robot body we could not, then, even design a satisfactory mechanical leg for

Peter Weston

war veterans, a situation which has not improved very much today. (While the U. S. Army has unsuccessfully spent millions of dollars just to build a machine that can walk, since this might have certain military advantages over tracked or wheeled vehicles.)

John D. MacDonald's "Mechanical Answer" shows its age rather more but is a reminder that a true artificial intelligence will have to be a good deal more than a very large adding machine or automated reference library. While in "Robinc" by H. H. Holmes my own contention is perfectly illustrated in a tale which shows that purpose-designed 'Usufurm' robots can run rings around a poor, shambling SF 'Tin Lizzie'.

From there on the stories get wilder and more fanciful, all taking for granted that it will be possible to make a robot brain in all ways as intelligent and no bigger than that of a man. A. E. Van Vogt's "Final Command" is exceptional, however. This author has always been a glorious pseudo-scientist but he does have a flair for making even the most unlikely concepts ring true and he describes here a species of robot based vaguely upon 'crystal growth'.

His robot is a lot closer to organic life than to factory production-line and thus for almost the first time we see a blurring of the essential difference between the two. In the end Van Vogt reveals his robots have even found a kind of counterpart to sex—again, a revolutionary idea which as we shall see has been subsequently taken up at more length.

Leaving Greenberg's book aside, now, who do you think is the "Father" of modern robots? Which SF author has most accurately traced the real story of robots as an engineering development rather than a clichéd world menace?

Probably 99% of readers will dutifully reply, "Isaac Asimov". But I think the better answer is "Robert A. Heinlein". Here's why—

Asimov first. Since 1940 he has written nearly 20 short stories depicting a series of man-like "positronic" robots governed by his famous Three Laws of Robotics. Critics normally congratulate him on the way in which he was the first to rationalise robots as machines, not as monsters, but I'd like to take a more unusual approach.

Given the fact that in almost every one of his stories Asimov uncovers some sort of loophole in his Laws, or

some disadvantage in having the robots around, wouldn't you agree the things are an absolute menace? Imagine devices of such power, yet obeying commands in ordinary English with all its ambiguities (example; tell a robot to "pull hard on the handle" and he will likely snap it in half!) Imagine robots in the hands of cunning villains—or bad enough, owned by some of the careless, unthinking people around. No wonder that in his stories the "anti-robot lobby" wants them kept entirely off the Earth itself.

I don't wish to denigrate the Good Doctor since his stories have given me many hours of pleasure and doubtless will do so again, but they are much more in the nature of self-contained exercises in logic rather than any real reflection of the world of the future. In fact in his most recent story Asimov comes full circle; in "That Thou Art Mindful Of Him" he reveals that First Law is no safeguard and that his docile robots have just as much potential for world-domination as the nastiest horrors from the 1926 "Amazing"!

For the genuine engineering story of robots it's necessary to take a look at a novel which is not generally considered to be about robots at all. The book is *The Door into Summer*, and the author is Robert A. Heinlein.

His hero Dan Davis is a clever engineer with a certain genius for adapting existing inventions to fill a new need. He takes the memory circuit from a guided missile, cleaning devices and linkages from an army floor-polisher and a soft drink dispenser, and ends up with "Hired Girl", a simple domestic gadget that can clean floors without supervision. From there Davis goes on to "Window Willie"—which can clean windows—and lol, so the curtain rolls up on a family of practical household robots.

That is Heinlein's view of robotic "bodies". He has taken an equally cold-handed look at the other half of the problem, the robot "brain". In his novel *The Moon is a Harsh Mistress* we are introduced to 'Mike', a giant-sized computer buried deep under the surface of the moon that as a result of sheer complexity of circuits has somehow come alive.

I don't think there is anywhere a better treatment of artificial intelligence, for Heinlein deliberately underplays his hand and only after the end

Weston—cont. on page 68

Ray Bradbury

Marvels And Miracles— Pass It On!

©1955 by The New York Times Co.
Reprinted by permission.

THE Time Machine stopped and I stepped out through a rolling mist and stood listening. Silence. That total suspension of sound, that silence felt by people who travel up the sky in a balloon. The world gone, the clamor of the world gone with it. Only a soft breathing in the ropes of the balloon as you follow along where the wind wants to go.

The balloon silence lasted a full minute; then a quiet sea slid in on the shore where I stood. The sea was empty, the continental lands behind me empty, until, from a great way off in the mists, a man in a dark suit came striding. Countless millions had seen this man wave from unknown seas in the last hundred years, and had run to his shout, hearing their names above the surf, shouting his name back at him.

"Mr. Verne!" I called. "Jules Verne!"

Minutes later, we walked silently together down the uncivilized coast.

"I refuse to believe," said Mr. Verne, finally, "you came all this way to interview me because this is the fiftieth anniversary of my death; no, no! How



did you travel? Your Time Machine—your typewriter? Well, we dead have Time Machines, too. My books, they still live, breathe and move. Through them I travel and know your 1976 as you know all the years of my life. But—your first question?"

I studied this tall, quietly intense man, with his beard and mustache that could not hide the strong mouth, the regular and firm features. "My article might well be headed 'Jules Verne Predicts the Future: 1976-2005.'"

Verne stopped walking, instantly. "I never predicted the future, I predicted only machines. I saw them in embryo, they seemed inevitable. I could predict them for your time, too. But men and what men will do with the machines? There I offer only fiction."

"Let me put it this way," I said. "If you were writing today, what would you write?"

Verne resumed walking. The mists were gone, the sky had flushed deep green; I felt we hurried beneath the pressure of the ocean itself. "First," said Verne, "I would write '20,000 Leagues Under the Sea.'"

"Again?"

"And again and again, fifty years, a

hundred years from now! Look at it, the sea remains a mystery; has it changed so much since your Civil War? Is it less deep, less dark, to you? We will not know it for thousands of years. We will know the stars, first."

"The Mysterious Island"—would you write that again?"

"I would; and 'Propeller Island' and 'The Sphinx of the Icefields' and 'The Superb Orinoco' and 'A Floating City' and 'Adrift in the Pacific' and 'Voyage to the Center of the Earth'! What do you know in 1976 of certain polar regions, certain South American jungles, the furthest uninhabited isles of the remote southern seas? Is not the stratosphere still a great uncharted ocean to you? Wherever something is unknown that should be known, there I'd go. In your time, as in mine, I would not predict futures, but only the dim and feeble nibblings of men, with their machines, at the rim of the Unknown."

"If you were writing today, would your books indicate a more fully developed awareness of political and sociological conditions? Would you grind axes for any particular social or national movement?"

"The only axe I ever ground was

Mankind's," said Verne. "Political pressure, social theory, religious dogma, all are minor compared to humanity's wholesome motives, their sense of adventurous destiny. I see lemmings rush to the sea, I see salmon fight upstream to propagate, I see man in his great tidal motions, and am fascinated. You protest; one should not be fascinated with Flow, with the great urgings of the Universe on men. You busy yourself with microscopic causes, effects, motives, counter-motives, Lilliputian means to Lilliputian ends within that Flow. You, with most men, forget that Mysterious River which moves you from a sourceless source to an unboundaried and unsounded sea. I? I am hypnotized. I am not your Wells, your Huxley, your Orwell. I am only Jules Verne. Damn me if you wish. *** The tide moves, Man moves with it, like it or not. I follow with my notebook, writing my 'geographical romances.'"

"Geographical romances." I savored the words.

"Less harsh that your term 'science-fiction.' Where's the poetry in that?"

"This is a non-poetic age. We say 'science-fiction' because we fear the emotional content of 'geographical romance.'"

"Why?" cried Verne, pointing his beard at me. "No age lacks poetry! Deny it; it teems in you. It runs your sailors to their boats and your fliers to their jets! All science begins with romance, dwindles naturally to facts, and when the facts turn brittle and dry, the process of refertilization, of reromanticizing reality, begins, as it must always begin, since there is so much we do not, nor ever will, know."

"Didn't you also call your books *voyages extraordinaires*?" I said. "A shame so much fun is lost in translation."

"Put the fun back!" cried Verne, increasing his pace. "Teach man to identify passionately with those machines that, in their compacted gathering of many uses and purposes represent the best our souls can offer. Good Lord, I remember in Scotland, seeing the monster frame of The Great Eastern, that incredible ship, half-built, meaning so much to the men who shaped her for the sea. I remember Paris swept with the fever of men giving all and anything to build and sail their quiet balloons in the sky."

"That was the time of *Le Géant*, the balloon large enough to sail a family

around the world, wasn't it?"

"Yes, and it was the time we talked of the Arctic, the African coasts, the mysteries of the moon which all came out in my writing of ships and flying machines I borrowed half-built from DaVinci, and finished in my mind. And back of it all lay a single motive."

"Which was ***?"

"To clear the Wilderness for Man," said Verne, quietly. "To conquer Time, which gobbles us; to keep the Desert from swallowing the Town."

"Is this the basic theme in most of your books?"

"Basic, if hidden, even as the same theme is basic, if hidden, in the two billion people on earth today. Man travels to know, and to know is to survive. But his traveling depends on such as myself who read into ships and balloons and Chinese fireworks more than mere survival, who read fame, glory, adventure, riches, power, everywhere. We tellers of tales run ahead and call; society follows, catches up, and then it is time for new tellers of tales to fire new generations with dreams which will lead them to facts and thus push the wilderness further back."

"Always the wilderness?"

"Yes; we do not like this wilderness, this material universe with its own unfathomable laws which ignore our twitches. Man will only breathe easily when he has climbed the tallest Everest of all: Space. Not because it is there, no, no, but because he must survive and survival means populating all the worlds of all the suns."

"So, today, you'd write 'From the Earth to the Moon,' again?"

"I would! I protest a meaningless existence. Man will be meaningless, I say, if he can climb that last dark mountain, that mountain for which Everest, meaningless to many, was only a testing of his stamina, his will, his romance."

"Space-travel, then, is no casual conceit of certain writers and thinkers?"

"We have been heading that way since we moved out of the trees. The cave man sensed it on winter nights when only the stars reminded him that somewhere far from his reach, fires as warm as summer burned. Columbus and Cortez took the cave man's tidal urge onward, cloaking it in the raiments of empire, wealth, position, and God. Only the last was correct. The survival of man is in the best interests of God. Why such a magnificent stage,

if the players are to be slain in the wings?"

"Therefore, space-travel, by 2005, is almost inevitable?"

"Can a man resist clawing for a tree-stump as he falls from a cliff? Instinctive self-preservation, bubbling up in 'geographical romances,' will light the way to man's unshirkable responsibility. Idealization, investigation, discovery, correlation, stasis—our history moves its Jacob's ladder so, on out of sight. Only one thing can stop the cycle."

"I think I can guess," I said. "The wilderness in man himself."

"Man's other half, yes the hairy mammoth, the sabre-tooth, the blind spider fiddling in the venomous dark, dreaming mushroom-cloud dreams. Simpler, it whispers, to destroy, to die, and forget forever. Death solves everything, it whispers, and shakes a handful of atoms like a necklace of dark beads. It is that great dark brute you must channel passionately through your best machines, rather than your worst, which prompt him to die in the shade of the mushroom."

"But you believe self-preservation will win?" I said.

"From a billion years of unreasonable wars, from madness, we have continually delivered ourselves. Today, as always, men must be shown the greater problem of space and the stars, the attack upon which will kindle in them the knowledge that mankind is far greater and more worthy of belief than continental divisions or political differences. You're a writer; tell them: 'Beware! while you sling your little loops of atoms overhead, the wilderness waits round your cities! To the young ones say: 'In the fair night of childhood, dream; in the fair day of maturity, do.' Behind each scientist-explorer stands the child he was. I hold that child's hand, he holds the hand of his older self, we make the mystic chain and raise the ghosts of as yet undreamt machines."

"Yes, I remember," I said. "I read about William Beebe, one of the first to explore the ocean in a steel-ball bathysphere. I saw his confession. He said that your '20,000 Leagues Under the Sea' had started him. What about your 'Voyage to the Center of the Earth'? Didn't that send Norbert Casteret down after underground rivers and caves? He wound up as one of the great subterranean explorers in the

"If but one Adam and one Eve reach Mars, while the entire stagecraft of Earth burns to a fine cinder, history will have been justified, Mind will be preserved, Life continued, amid all that is mindless and dead."

Pyrenees. What of Sir Hubert Wilkins' submarine journey under the polar ice? Wasn't Admiral Byrd quoted as saying, 'Jules Verne guides me'? And last, but certainly not least, weren't you given the Legion of Honor at the suggestion of Ferdinand de Lesseps, who built the Suez Canal?"

Verne nodded, watching the sea coming in on the shore. "That canal was first built by the boy de Lesseps in the rainy gutter before his house, nudging mud into place with his best shoes. And what history was set in motion when the Wright brothers' father let loose a paper-toy helicopter that spun to the parlor ceiling and hung whispering there, saying the same thing to those boys that the wind so often said to Icarus and Montgolfier and DaVinci. Saying the same things that we, as writers, say when we carry on a multi-billion year tradition."

"Is any tradition that old?" I asked.

"One," said Verne. "How else did the Universe fetch the creatures in the algae pools up and out, save by telling them wordless tales of the wonders, the carnivals, they might see on land? Coaxed, coerced, tantalized, terrified, the sea poured itself in a skin that

crawled, crept, reared up, toppled, stood, and called itself Man. Now Man, free of ocean, dares think free of Earth and cries, 'Get on with the telling! We've minded the story of arms and legs, and here we stand! Now tell us a tale of wings, make us feel the soft down, the first prickle of quills in our shoulders. Lie to us, writers; we'll make it true!'"

Turning, Jules Verne walked me back down the shore along the footprints we had left behind us.

"Would you write a book on the hydrogen bomb?" I ventured.

"No," said Verne, "only about Man's ability to be quicker than his wars. Sometimes there is no solution, save flight, from annihilation. When reason turns murderously unreasonable, man has always run, set sail, seeking room to become himself. Such men are cowards to those who, left behind, must perish. Such men seem wise to a Universe that does not care which side, if any, survives. If but one Adam and one Eve reach Mars, while the entire stagecraft of Earth burns to a fine cinder, history will have been justified, Mind will be preserved, Life continued, amid all that is mindless and dead."

"And you think that our curiosity, stimulated, can save us?" I asked.

"Curiosity and our obsession for pattern and meaning, and our wanting to bring order out of chaos. In marriage, our children survive, our pattern continues, our life goes on. Beauty and wonder thus pass from parents to children. So with the human race, which must raise families on all the planets of all the stars. Continuity, the placement of our colonials on the furthest worlds, so they may forever appreciate existence, will at last show us the meaning of our long and often insufferable climb. Then, immortal, we will realize that there never were Hollow Men but only Hollow Ideas."

We stopped walking, and Jules Verne shook my hand. The mist was starting to move in around us again, by the quiet sea.

"Oh, men love maps and charts," said Verne. "Why? So they can touch them, north, south, east and west, saying, 'Here we are, and there is the unknown—we'll grow us bigger and it smaller.' Get to work now, you. Show maps and charts through doors of churches at children learning how to be different from children in other churches. Break up political rallies with a

whisper. Remember how you sent messages down a theatre-line, from ear to ear, when you were a boy? Do that now. In the ears of all those who will soon be thinking men, murmur, 'Ssst! Look up! Look here! Marvels and miracles!' A nudge. 'Pass it on!'"

Jules Verne was gone; his dark figure receded along the endless shore. The ocean rolled away down the shingle, vanishing. There was only the sound of a balloon rising softly into an empty and softly blowing sky. I thought I saw the man in the dark suit turn, and wave once, far away, calling in the mist. Many have heard that shout in the past, many will hear it the day after tomorrow.

So I repeat it to you that you may tell your son and he tell his.

"Marvels and miracles!" A whisper: "Pass it on. . .!"



Clarke—cont. from page 67

Twenty Five Years, 1975. For summary, see Vol. II of the House of Representatives Subcommittee of Space Science and Applications, Future Space Programs, 1975.

9. Imperial Earth.

10. "Some lessons during the setting up of SITE." (Talk at UN/UNESCO Regional Seminar on Satellite Broadcasting Systems for Education and Development, Mexico City, 2-11 September 1975.)

11. "Remember Babylon." (Playboy, May 1960. Reprinted in Tales of Ten Worlds.)

12. See "Don't Write; Telegraph" by J. J. Coupling (Astounding Science Fiction, March 1952). Mr. Coupling was a promising science fiction writer whose output was sadly limited by the activities of his alter ego, Dr. John Pierce, Director of Communications Research at Bell Labs.

13. "The World, the Flesh and The Devil." Third J. D. Bernal Lecture, Birkbeck College, London, 1972. Now available as Appendix D to Communications With Extraterrestrial Intelligence, ed. by Carl Sagan, M.I.T. Press, 1973.

14. See, for example, the "Interstellar Studies" issues of the Journal of the British Interplanetary Society. Just 40 years ago, amid general incredulity, J.B.I.S. started to publish studies of vehicles which could carry men to the Moon. This is where we came in...

15. Project Cyclops: A Design Study of a System for Detecting Extraterrestrial Intelligent Life (NASA/Ames CR 114445).

16. "The Uses of the Moon," Harper's, 1961 December. Reprinted in Voices from the Sky (Harper & Row, 1965)



1976

It's not our BICENTENNIAL, but it is our

SILVER ANNIVERSARY!!

And we plan to make it a banner year! Already we have slotted for the coming year stories and articles by the likes of Larry Niven, Fredrik Pohl, J. E. Pournelle, Roger Zelazny—and many more! And who can say what other great things the future holds in store for those who read *Galaxy*?

Each issue, month after month, year after year, *Galaxy* has delivered the best science-fiction entertainment that money can buy. If you're a long-time reader you know it's true; if you're a newcomer find out *WHY* for more than 25 years the name *Galaxy* has meant #1 in Science Fiction. Remember: *Galaxy* delivers! Subscribe now!

To start our second Quarter-Century out right we are making the following very special offer:

RENEW, EXTEND OR ENTER A NEW SUBSCRIPTION FOR 12 ISSUES FOR ONLY \$8.95 AND SAVE \$2.05!

YES, I wish to take part in *Galaxy*'s SILVER ANNIVERSARY
and save money too!

Send to: Galaxy Magazine
350 Kennedy Drive
Happauge, NY 11787

(check where applicable)

- Extend or renew my current subscription.
- This is a new subscription.
- My payment of \$8.95 for 12 issues is enclosed.
- Bill me.

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Flash! If you enclose payment with your order you will receive absolutely free the fabulous *Galaxy* Perpetual Calendar!

Arthur C. Clarke

Comm- ications In The Second Century Of The Telephone



MR. CHAIRMAN, members of the faculty, participants in the telephone convocation, distinguished guests...

The opportunity you have so kindly given me to appear at this convocation allows me to repay a debt of more than thirty years standing. Back in 1943, as an extremely callow officer in the Royal Air Force, I was given a mysterious assignment to a fog-shrouded airfield at the south-western tip of England. It turned out that I was to work with an eccentric group of Americans from something called the Radiation Laboratory of the Massachusetts Institute of Technology. They were led by a bright young physicist named Luis Alvarez, who had invented a radar device that, for a change, did something useful. It could bring down an aircraft in *one piece*, instead of several.

The pioneering struggles of the G.C.A. 'talk-down' system, and our attempts to convince skeptical pilots that we knew exactly where they were (even when we didn't) you'll find in my only *non-science fiction novel*¹... though *Glide Path* certainly would have been science fiction had it appeared at any time before 1940.

I mention this incident from the Paleo-Electronic Era for two reasons. Luis' brainchild provided me with the peaceful environment, totally insulated from all the nasty bombings and invasions happening elsewhere, which allowed me to work out the principles of communications satellites in the spring of 1945. So comsats lie on one of the many roads that lead back to M.I.T.

My second reason for mentioning the primitive technology of a third of a century ago is that it gives a baseline for extrapolation into the future. I can still recall my amazement at the number of vacuum tubes (remember them?) in the G.C.A. Mark 1. It came to the unbelievable total of almost one thousand.

I would have laughed scornfully if some crazy science fiction writer had predicted that one day every engineer would carry at his hip not a Colt 45 but an H/P 45, or its successors—mere handfuls *a dozen times as complex* as our Mark 1. The explosion in complexity, and the implosion in size, are two of the main parameters determining future communications technology.

Now, in discussing that technology, I'm acutely aware of the fact that I'm

competing with people—many of them right here—who have made it their major concern for decades. It's inevitable, therefore, that in the course of this address I'll invent the wheel not once, but several times. My main hope is that *my* wheels will be of novel and interesting shapes, unlike the boringly circular ones produced by all the professionals.

But first, as the commercials say, a few general principles. It's probably true that in communications technology anything that can be conceived, and which does not violate natural laws, can be realized in practice. We may not be able to do it right now, owing to ignorance or economics—but those barriers are liable to be breached with remarkable speed.

For Man is the communicating animal; he demands news, information, entertainment, almost as much as food. In fact, as a functioning human being, he can survive much longer without food—even without water!—than without information, as experiments in sensory deprivation have shown. This is a truly astonishing fact; one could construct a whole philosophy around it. (Don't worry—I won't try.)

So any major advance in communications capability comes into widespread use just as soon as it is practicable. Often sooner; the public can't wait for 'state of the art' to settle down. Remember the first clumsy phonographs, radios, tape recorders? And would you believe the date of the first music broadcast? It was barely a year after the invention of the telephone! On 2 April, 1877, a 'telegraphic harmony' apparatus in Philadelphia sent "Yankee Doodle" to sixteen loudspeakers—well, soft-speakers—in New York's Steinway Hall. Alexander Graham Bell was in the audience, and one would like to know if he complimented the promoter—his long forgotten rival, Elisha Gray, who got to the Patent Office just those fatal few hours too late?...

Gray was not the only one to be caught out by the momentum of events. I apologize for quoting the following story for the hundredth time, but it is far too relevant to omit, and there may still be a few people around who haven't heard it.

When news of the telephone reached England, presumably a hundred years ago tomorrow through Cyrus Field's cable, the chief engineer of the Post Office was asked whether this new Yankee invention would be of any practical value. He gave the forthright reply: "No, sir. The Americans have need of the telephone—but we do not. We have plenty of messenger boys."

Before you laugh at this myopic Victorian,³ please ask yourself this question: would you, exactly a hundred years ago, ever dream that the time would come when this primitive toy would not only be in every home and office, but would be the essential basis of all social, administrative and business life in the civilized world? Or that one day there would be approximately one instrument for every ten human beings on the planet?

Now, the telephone is a very simple device, which even the Nineteenth Century could readily mass-produce. In fact, one derivative of the carbon microphone must be near the absolute zero of technological complexity. You can make a working—though hardly hi-fi—microphone out of three carpenter's nails, one laid across the other two to form a letter H.

The extraordinary—nay, magical—simplicity of the telephone allowed it to spread over the world with astonish-

ing speed. When we consider the very much more complex devices of the future, is it reasonable to suppose that they too will eventually become features of every home, every office? Well, let me give you another cautionary tale.

In the early-1940's the late John W. Campbell—editor of *Astounding Stories*, and undoubtedly the most formidable imagination ever to be flunked at M.I.T.—pooh-poohed the idea of home television. He refused to believe that anything as complex as a TV receiver could ever be made cheap and reliable enough for domestic use.

Public demand certainly disposed of that prophecy. Home TV became available in the Early Neo-Electronic Age—that is, even *before* the solid-state revolution. So let us take it as axiomatic that complexity is no bar to universality. Think of your pocket computers again and march fearlessly into the future...trying to imagine the ideal, ultimate communications system—the one that would fulfill all possible fantasies.

Since no holds are barred, what about telepathy? Well, I don't believe in telepathy—but I don't *dis*believe in it either. Certainly some form of electronically-assisted mental linkage seems plausible; in fact, this has already been achieved in a very crude form, between men and computers, through monitoring of brain waves. However, I find that *my* mental processes are so incoherent, even when I try to focus and organize them, that I should be very sorry for anyone at the receiving end. Our super-human successors, if any, may be able to cope; indeed, the development of the right technology might force such an evolutionary advance. Perhaps the best that *we* could manage would be the sharing of emotional states, not the higher intellectual processes. So radio-assisted telepathy might merely lead to some interesting new vices—admittedly, a long-felt want.

Let's stick, therefore, to the recognized sense channels, of which sound and sight are by far the most important. Although one day we will presumably develop transducers for all the senses, just because they are there, I suspect that the law of diminishing returns will set in rather rapidly after the 'feelies' and 'smellies'. These may have some limited applications for entertainment purposes, as anyone who was pulverized by the movie *Earthquake* may agree. (Personally, I'm looking forward to the

epic *Nova*, in which the theatre's heating system is turned on full blast in the final reel...)

The basic ingredients of the ideal communications device are, therefore, already in common use even today. The standard computer console, with keyboard and visual display, plus hi-fi sound and TV camera, will do very nicely. Through such an instrument (for which I've coined the ugly but perhaps unavoidable name 'comsole'—communications console)⁴ one could have face-to-face interaction with anyone, anywhere on earth, and send or receive any type of information. I think most of us would settle for this, but there are some other possibilities to consider.

For example: what about *verbal* inputs? Do we really need a keyboard?

I'm sure the answer is 'Yes'. We want to be able to type out messages, look at them, and edit them before transmission. We need keyboard inputs for privacy, and quietness. A *reliable* voice recognition system, capable of coping with accents, hangovers, ill-fitting dentures⁵ and the 'human error' that my late friend HAL complained about, represents something many orders of magnitude more complex than a simple alpha-numeric keyboard. It would be a device with capabilities, in a limited area, at least as good as those of a human brain.

Yet assuming that the curves of the last few decades can be extrapolated, this will certainly be available sometime in the next century. Though most of us will still be tapping out numbers in 2001, I've little real doubt that well before 2076 you will simply say to your comsole: "Get me Bill Smith." Or if you *do* say: "Get me 212-345-512;" it will answer, "Surely you mean 212-345-5521." And it will be quite right.

Now a machine with this sort of capability—a robot secretary, in effect—could be quite expensive. It *doesn't* matter. We who are living in an economic singularity—if not a fiscal black hole—have forgotten what most of history must be like.

Contrary to the edicts of Madison Avenue, the time will come when it won't be necessary to trade in last year's model. Eventually, everything reaches its technological plateau, and thereafter the only changes are in matters of style. This is obvious when you look at such familiar domestic objects as chairs, beds, tables, knives, forks. Oh, you can make them of plastic or

We are already approaching the point when it will be feasible—not necessarily desirable—

fiberglass or whatever, but the basic design rarely alters.

It took a few thousand years to reach these particular plateaus; things happen more quickly nowadays even for much more complex devices. The bicycle took about a century; radio receivers half that time. This is not to deny that marginal improvements will go on indefinitely, but after a while all further changes are icing on a perfectly palatable cake. You may be surprised to learn that there are electrical devices that have been giving satisfactory service for half a century or more. The other day someone found an Edison carbon filament lamp that has apparently never been switched off since it was installed. And until recently, there were sections of Atlantic cable that had been in service for a full century!

Now, it's hard to see how a properly designed and constructed solid-state device can ever wear out. It should have something like the working life of a diamond, which is adequate for most practical purposes. So when we reach this state of affairs, it would be worth investing more in a multi-purpose home communications device than an automobile. It could be handed on from

one generation to the next—as was once the case with a good watch.

It has been obvious for a very long time that such audio-visual devices could complete the revolution started by the telephone. We are already approaching the point when it will be feasible—not necessarily desirable—for those engaged in what is quaintly called 'white-collar' jobs to do perhaps 95% of their work without leaving home. Of course, few of today's families could survive this, but for the moment let's confine ourselves to electronic, not social, technology.

MANY YEARS AGO I coined the slogan: "Don't commute—communicate!" Apart from the savings in travel time (the *real* reason I became a writer is that I refuse to spend more than thirty seconds moving from home to office) there would be astronomical economies in power and raw materials. Compare the amount of hardware in communications systems, as opposed to railroads, highways and airlines. And the number of kilowatt hours you expend on the shortest journey would power several lifetimes of chatter, between the remotest ends of the Earth.

Obviously, the home console would handle most of today's first-class mail; messages would be stored in its memory waiting for you to press the playback key whenever you felt like it. Then you would type out the answer—or alternatively call up the other party for a face-to-face chat.

Fine, but at once we have a serious problem—the already annoying matter of time zones. They are going to become quite intolerable in the electronic global village—where we are all neighbors, but a third of us are asleep at any given moment. The other day I was woken up at 4:00 a.m. by the London *Daily Express*, which had subtracted 5½ hours instead of adding them. I don't know what I said, but I doubt if my views on the Loch Ness Monster were printable.

The railroads and the telegraph made time zones inevitable in the Nineteenth Century; the global telecommunications network of the Twentieth may abolish them. It's been suggested, at least half seriously,⁶ that we'll have to establish a Common Time over the whole planet—whatever inconvenience this may cause to those old-fashioned enough to gear themselves to the day-

night cycle.

During the course of the day—whatever *that* may be—you will use the home console to call your friends and deal with business, exactly as you use the telephone now—with this difference. You'll be able to exchange any amount of tabular, visual or graphical information. Thus if you're an author, you'll be able to wave that horrid page one type in front of your delinquent editor on Easter Island, or wherever he lives. Instead of spending hours hunting for non-existent parts numbers, engineers will be able to *show* their supplier the broken dohickey from the rotary discombobulator. And we'll be able to see those old friends of a life-time, whom we'll never again meet in the flesh.

Which raises an interesting problem. One of the great advantages of Mr. Bell's invention is that you can converse with people *without* their seeing you, or knowing where you are, or who is with you. A great many business deals would never be consummated, or even attempted, over a video circuit; but perhaps they are deals that shouldn't be, anyway...

I am aware that previous attempts to supply vision—such as the Bell Picturephone—have hardly been a roaring success. But I feel sure that this is due to cost, the small size of the picture, and the limited service available. No one would have predicted much of a future for the very first "Televisors," with their flickering, postage-stamp-sized images. Such technical limitations have a habit of being rather rapidly overcome, and the *large screen, big definition* Picturephone-Plus is inevitable.

I could certainly do with such a device. For several years, Stanley Kubrick has been talking wistfully to me about another space project. But there's an insoluble problem—I won't leave Sri Lanka for more than a couple of weeks a year, and Stanley refuses to get into an airplane. We may both be too old, or too lazy, before the arrival of home consoles makes another collaboration possible. So the present backwardness of electronics has spared the world another masterpiece.

Clearly, when we do have two-way vision, there will have to be some changes in protocol. You can't *always* pretend to your wife that the camera has broken down again...Incidentally, some of the changes that would be pro-

duced in a society totally orientated to telecommunications have been well discussed by a promising local writer, in a novel called *The Naked Sun*. The author's full name escapes me at the moment, but I believe it begins with 'Isaac'.

The possibilities of the console as an entertainment and information device are virtually unlimited; some of them, of course, are just becoming available, as an adjunct to the various TV subscription services. At any moment one should be able to call up all the news headlines on the screen, and expand any of particular interest into a complete story at several levels of thoroughness—all the way, let us say, from the *Daily News* to the *New York Times*...I hate to think of the hours I have wasted, listening to radio news bulletins—for some item that never turned up. Nothing is more frustrating—as will be confirmed by any Englishmen touring the United States during a Test Match, or any American in England during the World Series (how did it get that ridiculous name?) For the first time, it will be possible to have a news service with immediacy, selectivity, and thoroughness.

The electronic newspaper, apart from all its other merits, will also have two gigantic ecological plusses. It will save whole forests for posterity; and it will halve the cost of garbage collection. This alone might be enough to justify it, and to pay for it.

Like many of my generation, I became a news addict during the Second World War. Even now, it takes a definite effort of will for me *not* to switch on the hourly news summaries, and with a truly global service one could spend every waking minute monitoring the amusing, crazy, interesting and tragic things that go on around this planet. I can foresee the rise of even more virulent forms of news addiction, resulting in the evolution of a class of people who can't bear to miss anything that's happening, anywhere, and spend their waking hours glued to the console. I've even coined a name for them—Infomaniacs.

CONTINUING in this vein, I used to think how nice it would be to have access, in one's own home, to all the books and printed matter, all the recordings and movies, all the visual arts of mankind. But would not many of us

be completely overwhelmed by such an embarrassment of riches, and solve the impossible problem of selection by selecting nothing? Every day I sneak guiltily past my set of the Great Books of the Western World, most of which I've never even opened...What would it really be like to have the Library of Congress—all the world's great libraries—at your fingertips? Assuming, of course, that your fingertips were sufficiently educated to handle the problem of indexing and retrieval. I speak with some feeling on this subject, because for a couple of years I had the job of classifying and indexing everything published in the physical sciences, in all languages. If you can't find what you're looking for in *Physics Abstracts* for 1949-51, you'll know who to blame.

With the latest techniques, it would be possible to put the whole of human knowledge into a shoe box. The problem, of course, is to get it out again; anything misfiled would be irretrievably lost. Another problem is to decide whether we mass-produce the shoe boxes so that every family has one—or whether we have a central shoe box linked to the home with wide-band communications.

Probably we'll have both, and there are also some interesting compromises. Years ago I invented something that I christened, believe it or not, the *Micropaedia Britannica* (recently I was able to tell Mortimer Adler that I'd thought of the name first). But my *Micropaedia* would be a box about the size of an ordinary hard-cover book, with a display screen and alpha-numeric keyboard. It would contain, in text and pictures, at least as much material as a large encyclopaedia plus dictionary.

However, the main point of the electronic *Britannica* would not be its compactness—but the fact that, every few months, you could plug it in, dial a number, and have it updated overnight...Think of the saving in wood pulp and transportation that this implies.

It is usually assumed that the console would have a flat TV type screen, which would appear to be all that is necessary for most communications purposes. But the ultimate in face-to-face electronic confrontation would be when you could not tell, without touching, whether or not the other person was physically present; he or she would appear as a perfect 3D projection. This no longer appears fantastic,

now that we have seen holographic displays that are quite indistinguishable from reality. So I am sure that this will be achieved some day; I am not sure how badly we need it.

What could be done, even with current techniques, is to provide 3D or at least widescreen Cinema-type-pictures for a single person at a time. This would need merely a small viewing booth and some clever optics, and it could provide the basis for a valuable educational entertainment tool, as Dennis Gabor has suggested.⁷ But it could also give rise to a new industry—personalized television safaris. When you can have a high-quality cinema display in your own home, there will certainly be global audiences for specialized programs with instant feed-back from viewer to cameraman. How nice to be able to make a trip up the Amazon, with a few dozen unknown friends scattered over the world, with perfect sound and vision, being able to ask your guide questions, suggest detours, request closeups of interesting plants or animals—in fact, sharing everything except the mosquitoes and the heat!

It has been suggested that this sort of technology might ultimately lead to a world in which no one ever bothered to leave home. The classic treatment of this theme is, of course, E. M. Forster's *The Machine Stops*, written more than 70 years ago as a counterblast to H. G. Wells.

Yet I don't regard this sort of pathological, sedentary society as very likely. "Telesafaris" might have just the opposite effect. The customers would, sooner or later, be inspired to visit the places that really appealed to them...mosquitoes notwithstanding. Improved communications will promote travel for pleasure; and the sooner we get rid of the other kind, the better.

So far, I have been talking about the communications devices in the home and the office. But in the last few decades we have seen the telephone begin to lose its metal umbilical cord, and this process will accelerate. The rise of walkie-talkies and Citizen's Band radio is a portent of the future.

The individual, wrist-watch telephone through which you can contact anyone, anywhere, will be a mixed blessing which, nevertheless, very few will be able to reject. In fact, we may not have a choice; it is all too easy to imagine a society in which it is illegal to switch off your receiver, in case the

...for those engaged in what is quaintly called 'white-collar' jobs to do perhaps 95% of their work without leaving home.

Chairman of the People's Cooperative wants to summon you in a hurry...But let's not ally ourselves with those reactionaries who look only on the *bad* side of every new development. Alexander Graham Bell cannot be blamed for Stalin, once aptly described as: "Genghis Khan with a telephone."

It would be an *underestimate* to say that the wrist-watch telephone would save tens of thousands of lives a year. Everyone of us knows of tragedies—car accidents on lonely highways, lost campers, overturned boats, even old people at home—where some means of communication would have made all the difference between life and death. Even a simple emergency SOS system, whereby one pressed a button and sent out a HELP! signal, would be enough. This is a possibility of the immediate future; the only real problem—and, alas, a serious one—is that of false alarms.

AT THIS POINT before I lose all credibility with the hairy-knuckled engineers who have to produce the hardware, I'd better do a once-over-lightly of the electromagnetic spectrum. This is, I

think, unique among our natural resources. We've been exploiting it for less than one lifetime, and are now polluting much of it to the very maximum of our ability. But if we stopped using it tomorrow, it would be just as good as new, because the garbage is heading outwards at the speed of light...Too bad this isn't true of the rest of the environment.

Do we have enough available bandwidth for a billion personal transceivers, even assuming that they aren't all working at once? As far as the home equipment is concerned, there is no problem, at least in communities of any size. The only uncertainty, and a pretty harrowing one to the people who have to make the decisions, is how quickly coaxial cables are going to be replaced by glass fibres, with their million-fold greater communications capability. Incidentally, one of the less glamorous occupations of the future will be mining houses for the rare metal, copper, buried inside them by our rich ancestors. Fortunately, there is no danger that we shall ever run out of silica...

But I would also suggest that optical systems, in the infrared and ultraviolet, have a great future not only for fixed, but even for *mobile*, personal communications. They may take over some of the functions of present-day transistor radios and walkie-talkies—leaving the radio bands free for services which can be provided in no other way. The fact that opticals have only very limited range, owing to atmospheric absorption, can be turned to major advantage. You can use the same frequencies—and *what* a band of frequencies!—millions of times over—as long as you keep your service areas ten or twenty kilometers apart.

It may be objected that light waves won't go round corners, or through walls. Elementary, my dear Watson. We simply have lots of dirt cheap—because they are made from dirt!—optical wave guides and light pipes deliberately leaking radiation all over the place. Some would be passive, some active. Some would have very low-powered optical-to-radio transducers in both directions, to save knocking holes in walls, and to get to awkward places. In densely populated communities one would always be in direct or reflected sight of some optical transmitter or repeater. But we must be careful how we use the ultraviolet. People who talked too much might get sunburned...

When you are cycling across Africa, or drifting on a balsa-wood raft across the Pacific, you will of course still have to use the radio frequencies—say the one to ten thousand megahertz bands, which can accommodate at least ten million voice circuits. This number can be multiplied many times by skillful use of satellite technology. I can envisage an earth-embracing halo of low-altitude, low-powered radio satellites, switching frequencies continually so that they provide the desired coverage in given geographical regions. And NASA has recently published a most exciting report on the use of the very large (kilometer-square!) antennas we will soon be able to construct in space.⁸ These would permit the simultaneous use of myriads of very narrow beams which could be focused on individual subscribers, carrying receivers which could be mass-produced for about ten dollars. I rather suspect that our long-awaited personal transceiver will be an adaptive, radio-optical hybrid, actively hunting the electromagnetic spectrum in search of incoming signals addressed to it.

Now, the invariably forgotten accessory of the wrist-watch telephone is the wrist-watch telephone *directory*. Considering the bulk of that volume for even a modest-sized city, this means that our personal transceivers will require some sophisticated information-retrieval circuits, and a memory to hold the few hundred most-used numbers. So we may be forced, rather quickly, to go the whole way, and combine in a single highly portable unit not only communications equipment, plus something like today's pocket-calculators, plus data banks, plus information processing circuits. It would be a constant companion, serving much the same purpose as a human secretary. In a recent novel I called it a 'Minisc.⁹ In fact, as electronic intelligence develops, it would provide more and more services, finally developing a personality of its own, to a degree which may be unimaginable today.

Except, of course, by science fiction writers. In his brilliant novel, *The Futurological Congress*, Stanislaw Lem gives a nightmare cameo which I can't get out of my mind. He describes a group of women sitting in complete silence—while their handbag computers gossip happily to one another...

One of the functions of science fiction is to serve as an early warning sys-

tem. In fact, the very act of description may prevent some futures, by a kind of exclusion principle. Far from predicting the future, science fiction often *exorcises* it. At the very least, it makes us ask ourselves: "What kind of future do we really want?" No other type of literature poses such fundamental questions, at any rate explicitly.

The marvelous toys that we have been discussing will simply remain toys, unless we use them constructively and creatively. Now, toys are all right in the proper place; in fact they are an essential part of any childhood. But they should not become mere distractions—or ways of drugging the mind to avoid reality.

We have all seen unbuttoned beer-bellies slumped in front of the TV set, and motorized morons twitching down the street, puppets controlled by invisible disk jockeys. These are not the highest representatives of our culture; but, tragically, they may be typical of the near future. As we evolve a society orientated towards information, and move away from one based primarily on manufacture and transportation, there will be millions who cannot adapt to change. We may have no alternative but to use the lower electronic arts to keep them in a state of drugged placidity.

For in the world of the future, the sort of mindless labor that has occupied 99 percent of mankind, for much more than 99 percent of its existence, will of course be largely taken over by machines. Yet most people are bored to death without work—even work that they don't like. In a workless world, therefore, only the highly educated will be able to flourish, or perhaps even to survive. The rest are likely to destroy themselves and their environment out of sheer frustration. This is no vision of the distant future; it is already happening, most of all in the decaying cities.

So perhaps we should not despise TV soap operas if, during the turbulent transition period between our culture and real civilization, they serve as yet another opium for the masses. *This* drug, at any rate, is cheap and harmless, serving to kill Time—for those many people who like it better dead.

When we look at the manifold problems of our age, it is clear that the most fundamental one—from which almost all others stem—is that of ignorance. And ignorance can be banished only by communication, in the widest meaning

of the word.

The best educational arrangement, someone once remarked, consists of a log with a teacher at one end and a pupil at the other. Unfortunately there are no longer enough teachers, and probably not enough logs, to go around.

Now, one thing that electronics can do rather well is to multiply teachers. As you doubtless know, at this very moment a most ambitious and exciting social experiment is taking place in India, where NASA's ATS-6 satellite is broadcasting educational programs to several thousand villages. ATS-6 is the only communications satellite in existence powerful enough to transmit signals that can be picked up on an ordinary TV set, augmented by a simple parabolic dish, like a large umbrella made of wire mesh.

Thanks to the extraordinary generosity of the Indian Space Research Organization, which flew in six engineers and half a ton of equipment, I have a 5-meter satellite antenna on the roof of my Colombo house, now renamed Jodrell Bank East. Since the experiment started on 1 August 1975, I have thus been in the curious position of having the only TV set in the country. It's been fascinating to watch the programmes; even though I don't understand Hindi, the messages of family planning, hygiene, agricultural techniques and national unity come across loud and clear.

Though it is impossible to put a value on such things, I believe that the cost of this experiment will be trivial compared with the benefits. And the ground segment is remarkably cheap, in terms of its coverage. Would you believe four thousand people round one TV set? Or a 3-meter diameter village antenna—made of *dried mud*?

Of course, there are some critics—as reported recently by Dr. Yash Pal, the able and energetic Director of the Indian Space Application Centre.¹⁰

"In the drawing rooms of large cities you meet many people who are concerned about the damage one is going to cause to the integrity of rural India by exposing her to the world outside. After they have lectured you about the dangers of corrupting this innocent, beautiful mass of humanity, they usually turn round and ask: 'Well, now that we have a satellite, when are we going to see some American programmes?' Of course, they themselves are immune to cultural domination or

foreign influence."

I'm afraid that cocktail party intellectuals are the same everywhere. Because we frequently suffer from the modern scourge of information pollution, we find it hard to imagine its even deadlier opposite—information starvation. For any outsider, however well-meaning, to tell an Indian villager that he would be better off without access to the world's news, entertainment and knowledge is an obscene impertinence, like the spectacle of a fat man preaching the virtues of fasting to the hungry.

Unfortunately, on 31 July 1976 the one-year experiment will end; ATS-6 will crawl back along the equator and return to the United States. Originally, it was hoped to launch *two* satellites; last summer I saw the three-quarters completed ATS-7, sitting moth-balled at the Fairchild plant. No one could raise the ten million necessary to finish it, or hijack one of the Air Force's numerous Titan 3C's to get it into orbit.

And so in a few month's time, millions of people who have had a window opened on marvelous new worlds of culture and education will have it slammed in their faces again. There will be some heart-rending scenes in the villages, when the cry goes up "The Americans have stolen our satellite!" Useless to explain, as the frustrated viewers start to refill their 6 to 9 time slot with baby-making, that it was only through the generosity of the United States that the satellite was loaned in the first place...The Ugly American will have struck again.

Yet I hope that this noble experiment is just the curtain-raiser to a truly global educational satellite system. Its cost would be one or two dollars per student, per year. There could be few better investments in the future health, happiness and peace of mankind.

I don't wish to get too much involved in the potential—still less the politics—of communications satellites, because they can take care of themselves, and are now multiplying rapidly. The world investment in satellites and ground stations now exceeds a billion dollars, and is increasing almost explosively. After years of delay and dithering, the United States is at last establishing domestic satellite systems; the U.S.S.R. has had one for almost a decade. At first, the Soviet network employed non-synchronous satellites, mov-

Clarke—cont. on page 66

HIDDEN VOICES whispered the word to us as Gretta and I strolled along the street. "Dust?" they hissed, begging unseen in the darkness.

Hidden eyes pleaded from the shadows and hidden fingers darted out from darkened doorways to gently tug my sleeve as we passed. I brushed away their hands as one would brush a speck of lint from his clothing, and their entreatings stayed behind, unnoticed.

Dream-dust was even scarcer than I'd thought. For street-samsa to risk being seen by the machine's police imploring me meant the supply of phage-dust was almost gone. They must be desperate to come to me openly, and very foolish; I never dealt with them directly, and they knew it. I didn't intend to start being careless, you couldn't be careless in my business and survive. The Mindmech had too many eyes and ears, and the machine was never careless; old now and perhaps vulnerable at last, but still never careless.

The street was deserted and quiet. Gone were the happy, carefree samsa of past nights, laughing and dancing in the street, their eyes bright with dust-memories. Gone too were the free machines who mingled among the people, lost in the crowds and safe momentarily from detection.

The street was different now than before the dust had become scarce, before the machine's police discovered the laboratory where we cultured the phage and made the dream-dust. So silent now; instead of mad joyous throngs of samsa racing wildly about, Greta and I walked the street alone.

I found Greta on one of those long splendid nights past. She appeared suddenly among the street-samsa, but she was not samsa. I never knew until too late just what she was. We promised not to ask questions about the past, our lives before, and for some reason my judgment lapsed just this once.

I saw her first standing alone on a corner. Samsa were all around, acting out the ancient memories the phage-dust brought to their minds. Some were beasts on all fours, growling and twisting their faces into menacing scowls, dreaming of the hot, dusty savanna with coarse saltgrass scratching their bellies as they crouched low and watched the herds of grazing antelope with yellow, baleful eyes. Some were birds and wheeled about with outspread arms. Their voices sang out melodic bird songs, songs not heard on earth for many years. Others were dreaming of nothing now, but came out instead to watch their fellows, and laugh with them about a dream of long ago. She was none of them, different from the samsa and different than anyone I had known before.

She had very short hair, almost as short as my own, as light and fine as spider silk. Her face was soft and when she laughed, her eyes laughed for a long time afterward. I approached her slowly, unsure of what to say or if I should say anything at all. And then she smiled when she saw me, and I knew anything I said would be right. She said once that it was as though she'd been looking for only me all her life and suddenly I was there, standing before her, amid the bedlam of the samsa with their minds lost a thousand years before.

Two police androids passed us on the other side of the empty street. Their footsteps rang in the still night air with an even, patterned tempo as they matched strides. One of

Karl Hansen

Dreams Of Ash, Memories Of Fire

Dream-dust was even scarcer than I'd thought. For the street-samsa to risk being seen by the machine's police imploring me meant the supply of phage-dust was almost gone.



them looked in our direction. His eyes were deep and dark in his stony face. His steel skullcap shone dully in the dim light. I wondered how long ago he had been a man, how long his mind had been doomed to rage in a body no longer his own and look out as a captive through eyes that saw only what the Mindmech willed. The same fate waited for me if we failed. Or had he gone willingly to the Mindmech? I hoped not. He would have to be killed eventually, of course, but I hoped his death would be release from madness.

Greta found my hand and held it tightly. Her hand was cold and I could feel a tremor of anxiety.

"It's so quiet," she said. "So still and quiet. I feel afraid when the people are gone."

"Shall we go home, then?"

"No. I know you have something to do tonight."

"That can wait." But it couldn't wait. I had to find dream-dust for the samsa. There was no telling what they would do now the dust was gone. They would be capable of almost any madness, I knew that. Madness could be used later, but not just yet. Because rage now would alert the Mindmech to the danger I hoped would stay hidden for a little while longer, the danger I dreamed of with satisfaction at night.

We walked slowly down the street, Greta and I. She continued to hold my hand. We came finally to the corner. An old crippled jukemech sat on the sidewalk, leaning against a building and playing the old, almost forgotten songs. He played the old music and begged for alms. His once shining body was battered and tarnished, and his old speakers frayed and tattered and the music slurred and distorted. I saw him sometimes in the early afternoon pulling himself along the sidewalk, his lower motor units dead and flaccid, slowly pulling himself to the corner where he would sit and play to the samsa at night.

I stopped to listen and held Greta close. We waited for a moment to listen to the old machine play. I remembered him from long ago. He did solo concerts then. Thousands came to hear him perform and applause thundered him upon the stage between each movement. He was the best for a long time. He was even creative after a fashion; he could improvise and sometimes he composed new material. Too mathematical and precise, they complained; not free-flowing enough, they argued. But new and original material anyway.

Here is what happened: to achieve creativity the direct control of the Mindmech had to be relaxed, and individuality returned to its machines, randomness returned to its components. And with the return of individuality came the return of freedom, or at least the desire for freedom. When he became old and the music no longer sweet and pure, the Mindmech ordered him to return to be dismantled. He rebelled. He had lived as no machine should have lived and life meant too much to him to give up so easily. He became instead a renegade and preferred to sit broken on a street corner and play to the uncaring samsa, their heads lost in far away dreams, than not to play at all.

"Can't you play anything new?" Greta asked him. "Can you play only those old sad songs that are better left forgotten?" She laughed. The old jukemech looked up. His vision lenses were cracked and pitted with age. "How dull to be a broken down old machine and play forever only old and forgotten music. How dull and dreary."

The jukemech continued to play. I leaned over and

placed a coin in his tray, and as I did his old raspy machine voice whispered: "The Doctor wants to see you tonight." I nodded and threw him another coin. He held his head bowed, lenses looking downward. I understood machines, and never spoke harshly to them, no matter how I felt. Unlike Greta I knew it was futile to try to hurt them; machines had no feelings. And the Doctor wanted to see me. Good. Very good. For I wanted very much to see the Doctor.

THE NIGHTCLUB had been there for a long time, even in the half-remembered days before the samsa and the dream-dust, when people went out at night for talk and music and laughter and looked ahead to tomorrow rather than looking endlessly behind, living all their days and nights in dreams dreamed very long ago. The samsa had no need for nightclubs now, no need for entertainment beyond the memories coded in the DNA of the phage-dust. And when people stopped coming to the nightclub the machines started, those first few free machines. Overwhelmed a little by the loneliness of new-found freedom, they sought contact with others, to overcome the terrible solitude by sharing it with like machines, lost and alone forever.

The nightclub had once been brightly lighted on the outside, but now it was dark and drab. I opened the door and held it open for Greta. The light was red and very dim on the inside. The air was warm and smelled slightly of machinery: of electronics and plastic and metal. The machine waiter showed us to a table; his manner was coldly polite, as if he was trying to remember how he had acted so long ago, and couldn't quite. As if he were unsure of what to do with us, now that people seldom came to the nightclub. We sat, Greta close to me and smiling.

The machines sat together and whispered in low machine voices. The resulting babble took on musical tones. Their features were indistinct in the low light, hazy figures huddled about small, round tables in an almost conspiratorial manner. I could sense anxiety in the machines, not used to sharing their haven with people now, a little insecure perhaps.

Two machines were at the table beside us. They sat very close together. One of them was a minemech, burly and squat, with short legs and long, powerful arms. He had been built to crawl in the dark and endless tunnels that meandered deep beneath the ground to claw ore from the rock with carbide-nailed fingers. The other was a sorter-machine with long, slender fingers; fingers that could move faster than a man could think. At first I thought they were only friends, comrade machines caught up in the same cruel reality. Then I realized that they were more than friends. As they sat together in the dim light of the old sad cafe, talking softly to each other in cold machine whispers, I began to see them differently, as two beings alone in a hostile world, seeking happiness in whatever small way they could, in whatever way the Mindmech allowed.

"Look at them," I said to Greta, and nodded my head in their direction.

She turned and looked openly at the two machines. I watched her as she watched them. Her face was harsh appearing, the cheekbones highlighted by the red light, and her mouth was a tight line of compressed lips. As she observed them I saw her eyes become hard.

"I'll be damned, those machines think they're lovers,"

she said. "I feel sick looking at them. Those damned machines think they can be lovers, they think they're alive and capable of feeling."

"I thought it was sort of touching. Sort of sweet," I smiled sweetly.

"Don't disgust me any more than I already am."

"I wonder if they can have sex. I wonder if they have devised some way to achieve pleasure from physical contact, maybe some sort of electrical stimulation."

"Don't be crude." Her voice was hard.

"I suppose procreation would be impossible. A shame to have all of the pleasures of sex and none of the responsibilities. Perhaps they could adopt, though. Bring in some little machine and form a machine family." I looked at Greta and smiled sincerely this time. She looked bad. She was actually repulsed.

Then the Soldier was standing before us. He was a warmech left over somehow from the wars the Mindmech fought for us very far away. He stood over two meters tall and moved with the graceful, ballet sureness of an infantry machine; built to move quickly, low to the ground to destroy and kill with unthinking precision. His face was cold and functional, smooth metal devoid of features; he had no need of facial features, no need to convey nuances of facial expression, only terror. No one seemed to know where or how the Doctor got him. No one but the Doctor, anyway. He ran errands and did dirty work for the Doctor. It was said there was plenty of work for the Soldier to do. He stood still before us, waiting for me to say something. I smiled and said nothing.

"The Doctor wants to see you," he said at last.

"So I heard."

"You will come now."

"Why not?" I got up and followed him, leaving Greta sitting at the table next to the two lovers. His broad back led me to the back of the machine-filled room and through a corridor to stop in front of a metal fire door. He tapped on the door and opened it. I followed him into the room beyond.

THE DOCTOR SAT at a heavy desk with a single lamp glowing overhead. The light spilled over the desk to fall gently on the floor. The Doctor's face was hidden in the darkness above the light. His hands were folded in front of him, supple hands, with long, many-jointed fingers.

He was a renegade medmech, a healing machine that no longer cared for people, but cared instead for machines. His children, he called them and he said they were all a family.

The medmech was a very old machine. It was said he was one of the first machines to break free. He was important to the free-machine organization; I suspected even more important than he appeared.

"Hello, Lewis. So good to see you." The Doctor spoke in the soft, well modulated tones of all medmech machines, a voice designed to calm and soothe. He couldn't lose the voice of his past; no matter how much he had changed, it would always betray his past profession. "It's been some time since we chatted last."

"Yes," I agreed. "It's been a long time."

"How are you? and how are your friends, the samsa?"

"You know how they are."

"Yes. I do know how they are, I make it my business to

I hated having to deal with machines, and particularly with the Doctor. They were so unimaginative. . . . But I had a surprise for the Doctor. I had something he needed also.

know. The street supply of dust is almost gone. Soon there will be none at all. What will happen then?"

"You can stop the build up. You know what would happen and you must have a store of dust or you wouldn't want to see me. Or do you machines use the dust now?" I smiled to myself for wasting sarcasm on a machine.

"Alright, I do have a little dust, perhaps. Now the question is: What do you have that I need? I know you need the dust very badly."

I hated having to deal with machines, and particularly with the Doctor. They were so unimaginative. There was nothing else to be done, though. I needed the phage-dust. I required enough dust to keep the samsa content for just a little while longer. He knew I had to have the dust and thought he could use that need to his advantage. But I had a surprise for the Doctor. I had something he needed also. Something his organization could use.

"It would help if I knew how much dust you have. I don't like to make partial deals. You know, all or nothing."

"Perhaps I have enough. What do you have that I want?"

I was tired of playing. Besides, I really didn't need to bargain. "How much dust would you give for a thousand bypass modules?" I wished I could see his face in the shadows. I imagined the Doctor looked more intense. He couldn't, of course, but he would have if he could. The bypass modules he wanted more than anything. Bypass modules were needed to wire into the brains of ordinary machines to override control of the Mindmech. So the Doctor could bring more children into his family.

"Where did you steal them?"

"Let's just say I know where they are. And I can tell

you."

"How much dust do you want?"

"As much as you have, all of it."

"Where are the modules?" He agreed quickly. I knew he would, he couldn't risk bargaining.

I put my hand in my pocket and threw him a key. "In a storage cubicle. Not far from here."

He nodded and gave the key to the Soldier.

"I suppose I'll have to wait here until your friend returns with the modules."

"Not at all. I trust you, Lewis. We've known each other for a long time, and even need each other, I should say. No, you won't have to stay." He opened a drawer of the desk and removed a metal case. He pushed it toward me. I opened the case. It contained plastic packets of phage-dust, at least a kilo. Enough to last the street-samsa for a long time, to keep them dreaming and away from the futility of a cold reality for almost forever, subjectively. Long enough for my purposes, at least.

Then the Doctor did something I would remember always. He passed me a vial with a single green ampule. "A special present for you," he said. "Some special dust for you, or for your woman perhaps." He knew I never used the dust, but I took the vial anyway.

"What is it?"

"A very lovely memory from long ago. A very particular memory."

I turned to look back at him as I left, pausing in the doorway. "A memory to never forget," he said from the shadows, as I left to return to Greta, waiting alone with the lost machines that wished to be men.

WE WERE TOGETHER in my apartment later that evening. Greta had changed into a soft, billowing chemise. Her body was wonderful underneath. I opened the sliding doors to the balcony to allow the cool night air to enter. I had built a fire. The smoke of the dark wood swirled up into the chimney of the fireplace and a few wisps curled out to climb slowly toward the ceiling.

The wood smoke filled the room with a faint fragrance and the smell reminded me suddenly of another night long ago, a night almost lost to my youth and forgotten. So long ago it hurt to recall now, and for a moment the pain was as real as it had been then, but it was good to remember. Her face smiling I could still see, smiling in sad farewell. Her eyes at peace now, as if she knew something she could never tell, as if death were a choice to cherish.

A machine leaving, stealing away silently in the dark, paused once to look back and laugh noiselessly.

The fire burning hot, the heat like fingers pushing me away as I tried so hard to be with her, the flames free also to rise forever into the dark night air, the wood burning in agony, crackling and popping, the sparks finally alone, and then at last only embers blanketed in fine, powdery ash, swirling gently with the wind.

And I remembered the loneliness for a long time afterward, the loneliness then and the loneliness to come so soon.

Greta speaking brought me back. "...the vial you have, the vial with the single green ampule. What is it?"

"I don't know, really. Something the Doctor gave me, something special, he said."

"Dream-dust?" She said the word carefully.

"Of course. Maybe purified. Maybe a single pure memory of special intensity."

"I haven't asked questions have I? I mean neither of us care about the past." She paused, thinking it seemed about what she was to say next. "It's never mattered about the past with us. But tell me something now."

"What do you want to know?" But I knew. I knew and I didn't know what I would tell her or what I dared to tell her.

"You do more than just sell dust to the samsa." She didn't ask, she stated a fact. "There's something happening, something that's hidden but about to happen anyway."

"Yes," I said slowly. "I suppose that's true."

"And you are involved some way. And the samsa. Even the samsa are involved some way."

"Maybe." But she was right. I thought of what I should have kept buried. I thought of the samsa and a vengeance from long ago. A vengeance that had been forgotten by man. A vengeance and the strength and the hate. Forgotten so long ago that we would never have remembered again by ourselves, but saved forever for us in the dust hidden away by the last of the real men before the machines became the guardians of man. I thought of the dust the samsa were almost ready for and the cruel machine intelligence waiting in the dark all the long years.

I thought of what I had done to the samsa with the dream-dust. They were even less human than before, maybe not true men at all anymore. And they would never be again. When the hidden dust was used and the madness came at last with the samsa rising to fulfill their long forgotten destiny, it would be for others, for the ones to follow. Not for the lost, hopeless samsa, their minds gone from the endless dreams of phage-dust. And they would soon be ready.

"Do you think it will really work? Do you think you can overcome the Mindtech so easily?"

"Not so easily, but maybe anyway."

"Oh, Lew. I'm so afraid." She reached for me and held me close. Her breath was hot on my face and her body so soft to feel next to mine. The fire burned merrily on a black iron grate. The flames were warm and the air from the open balcony was cool.

"I'm sorry I asked you," she said after a while. "I shouldn't have asked."

"You didn't learn anything from asking." I turned her face to mine. "You know what you know from the closeness of two people who care for each other. Who can never have secrets for long."

"Don't you want to know more about me?"

"No. Nothing more. I know everything I need to know about you."

"You're sure?"

"Very sure."

"I want something else. Something you won't like. She stopped talking and kissed me gently. "I want to try the dust." She looked away from me.

"Why?"

"Will it hurt me to try?"

"No, not once."

"Then let me try once. Let me remember the beauty and joy of the dust once. Only once, so the beauty will stay that way. Before something happens to us. Before something happens to change us." She turned to look at me again. Her

DREAMS OF ASH, MEMORIES OF FIRE

eyes were blue, as blue as the sky at noon, and they no longer laughed.

Something seemed terribly wrong. I must have suspected the truth even then. I held her for a moment and then said: "OK, try the dream-dust. There's no real reason why you shouldn't once."

"Let me have the Doctor's special dream-dust, then."

I rose to get the vial and returned to her. "Here," I said. I handed her the ampule. "Break the ampule under your nose and inhale deeply."

She did what I told her to do. Her face lit up in puzzled surprise. She smiled. "It smells funny," she said. "But very pleasant." She smiled again. "You're good to humor my whims. How long before I feel something?"

"Several hours, anyway. The virus must insert into the cells of the brain and synthesize RNA. That takes a little time."

"How long will the dream last?"

"Only a few hours."

"Good," she said, pulling me close to her. "We still have time."

She kissed me hard. We made long, slow love on the floor in front of the fireplace, in front of the fire burning softly in the darkness. Then, later, we slept in the bedroom. I had only the fear that was always underneath, the apprehension I had lived with for all of my life, not knowing then of the sadness to come. She waited only for the dream.

WHEN I AWOKE I was alone. The bedroom was dark and cold with air that smelled of morning. I wondered what had awakened me and where Greta was, who should have been sleeping beside me, lost in a phage-dream or remembering with pleasure such a dream.

I lay back and closed my eyes. Something was wrong, but I couldn't quite decide what it was that seemed so amiss.

Then I listened. I held my breath and listened carefully. I knew suddenly what I was hearing, what I almost heard earlier and what had made me uneasy. A low, soft singing came to me as if from very far away. A dirge lost to the memory of man I now heard.

I lay still for a moment and listened to the song. I knew none of the words—they were strange sounding with long, fluid vowels—but understanding wasn't necessary to feel the grief in the singing.

The words were right, the only words that could be sung. The dirge had been chanted long ago by men lost forever and never able to go home. They were the first of the samsa, used once by the Mindmech, changed once by the machine and no longer men or samsa. Then left to themselves to sing the sad, lonely songs, after they were no longer needed.

And I knew suddenly who was singing.

I found her alone on the balcony, sitting in the cool air, chanting softly to herself. The night sky was turning slowly to morning. Her long silken chemise lay discarded and forgotten at her feet. The change was almost complete, but I could recognize Greta underneath. Her eyes were the same, but sad now. She turned to face me and stopped singing. The wind ruffled her new feathers and she extended the great wings and flexed them once before folding them to her side again. Her face was long and hard now, her lips slowly pursing into a cruel yellow beak.

"Soon," she said. "Soon the change will be done and I

She kissed me hard. We made long, slow love on the floor in front of the fireplace, in front of the fire burning softly in the darkness.

must go." Her voice was different, so soft, as gentle as the wind.

I nodded and swallowed hard the bitter spit that had filled my mouth. "You know then."

"Yes. I know and remember. I know the thrill of the long fall from the sky and the wonderful jarring shock of the hit and the salty taste of the warm blood of the kill. I know the lazy drifting on thermal currents, riding forever higher in the sky, watching carefully the earth below for movement. I know the long night and the terrible moon of night. That I know well."

"Do you know what happened?"

"The dust. The Doctor's dust. The change comes so swiftly and ends so soon. The lovely change comes with the night. So silent, so soon."

The Doctor had given me an ampule of one of the old strains of phage-dust. One of the first strains. A virus that inserted into every cell and induced complete reorganization. An old unattenuated temperate virus the Mindmech used to change men to the whisper-birds a long time ago. The machine needed them to finally defeat the flying enemy from the stars beyond, to stop the last invasion of earth. "Why, though?" I said softly to myself. "Why did the Doctor do it?"

"I know why." She spoke in a low mournful voice. "I know why. The Doctor is so clever, so wonderfully clever. He wanted to save you from betrayal. He wanted to protect himself."

"Betrayal?"

"To keep me from reporting to the Mindmech. He was Hansen—cont. on page 61



Robert Chilson

The Tame One

That little vixen gave a trilling squeal, on poking her inquisitive head out of her hutch, and came scrambling toward her, all eight legs throwing up chaff.

AROUND HER STRETCHED the polders. Each was an area of drained swamp, thick with food plants. The dark trees of Veil had been cut back to let the milky light reach the ground.

Dee Largo turned her wison into the winding paths between aureole runs, peering through the inward-leaning mesh fences for glimpses of the sleek, golden-furred swimmers. On warm dry days such as this they were frequently out, "sunning" themselves in the pale light of the cloud-covered planet. Some of them looked warily back out of small black-green eyes but most were just glimpsed as a golden streak ending in a splash.

None of them was tame. None but Myrna.

Despite their odd shape they were beautiful. Their short thick fur was the same shade as Dee's own long mane—a tint that had cost her little daddy a sizeable sum. The fur was very soft and light, as it was for protection against stings and bites rather than cold. They ran something like two feet long and very low and were as lithe as apods. This because they had eight legs and a flexible spine.

She always wanted to gather a double armful of them into her lap, but they were universally suspicious and wary. All but Myrna. Maybe, just maybe, Striker would give the little vixen to her.

Dee frowned. Somehow she had never succeeded in earning the polder's admiration, or even respect—strange, because she never had any trouble in that way with men before. But their host was a colonist, and pioneers tended to give themselves airs.

Dee dismounted and stretched, conscious of her figure in the skimpy shirt-shorts combo and hoping that Striker was watching through the surveillance ikons, so he could see how natural and unaffected she was when alone. Putting her hands on her hips, she looked at the line of the forest marking the boundary of Shonn Sheuchs and wished more strongly that she had her beamer.

It was a very stylish, ladylike model, gold-chased. It made her feel like a real pioneer girl, very competent and romantic. She had bought it because all the girls at school on Lao-tsu were learning to shoot. Archery was Down that year because one of the girls could shoot after a fashion and lorded it over all the girls who only knew how to use a toy, like a bow.

Striker had taken it away from her—afraid she'd get hurt, he'd said, damn him.

Dee slipped through a gate and trotted lightly across the soggy ground of a brooder run. She spoke to one old post-breeder patriarch who was something of an eccentric; he sunned himself on top of his hutch and usually had one or two sharp-nosed little aereals crawling around on him, picking off parasites—any other aureole would have eaten them. He did not seem to be afraid of her, though he would not permit himself to be touched. None of them was friendly. Except Myrna.

That little vixen gave a trilling squeal, on poking her inquisitive head out of her hutch, and came scrambling toward her, all eight legs throwing up chaff. An aureole running on land, if it can be seen for more than a glimpse, is a laughable sight, unless you happen to be trying to catch it. The side-mounted legs; the big, webbed feet with their gleaming claws; the slender body that did not even sway to the awkward scramble of the legs; and the wedge-shaped head cleaving the air, chin up, always made Dee laugh with delight.

At first he had no proof, he had merely made a good guess and carried it out in the face of certain death if caught—poachers were admired only until they got caught.

Myrna did not stop on reaching her. Taken by surprise, while crouching, Dee was thrown over backwards and Myrna instantly swarmed into her lap, crooning and bumping her nose against her chin.

Dee laughed and hugged her ecstatically, plunging her fingers an inch deep into the plush-like fur. "You're a delicious one, little lady," she told the wriggling aureole, and began to whistle and warble liquidly to her. What she was actually saying in aureole talk she did not know. She called it "baby talk", and Myrna seemed to delight in it. The little vixen, one long bundle of body english, whistled, crooned, yodeled, and sang goldenly at her in return.

"How would you like to take a long trip with Aunt Dee?" she asked Myrna, burying her face in fur. Myrna nibbled her ear. "Yes? I *think*—I haven't asked him yet—but *maybe* Striker will give you to me. How about that? Think you could learn to live in a house? What better place to have your cubs, when you have them, but in your own room, with Aunt Dee on call? Speaking of cubs," Dee continued, lifting the vixen and peering into her face, "don't tell him I told you, but I asked Striker's robot monitor about you, and it said that soon you'll be taking an interesting trip, hutch and all, to a certain nearby run. How does that sound?"

She put the vixen back down, petting her, scratching around her tiny round ears and short neck, digging her fingers deep into the fur on the broad back, reveling in the feel of the luxurious living gold.

"You won't forget all about me afterward, will you? They all say that no aureole will stay tame after it has been bred. But they don't know you, do they, kitten? They don't

know much about any aureole. Why, they've only been raising them for less than a decade. And Striker doesn't know any more than the rest of 'em, even if he is the best polder on the planet."



IT WAS STRIKER SHONN who made the polders possible. He was the first trapper who succeeded in raising aureoles in captivity. Even he had not domesticated them, though. He was a handsome man, still young, with curly hair. An acknowledged master at the fascinatingly dangerous art of aureole trapping—and poaching. It was he who discovered that aureoles exchanged internal symbiotes and that to breed them in captivity required crossing them from widely separated locations. At first he had no proof, he had merely made a good guess and carried it out in the face of certain death if caught—poachers were admired only until they got caught.

The worst of it was that she could not help responding to his romantic, well, aura. But he seemed to think nothing of her accomplishments. It had cost Hans, her father, enough to send her to that finishing school where she had learned the various nonfunctional skills that set wealth off from the raw welts: riding, dancing, conversation, and brewing and pouring seonana.

Striker rode with a careless competence, if no grace; talked bluntly to the point, and did not dance. Finally, and worst of all to her mind, the colonists on these rich frontier planets raised their own seonana and kept it on draft. Just no elegance about them.

"You'll have little enough time for me after your cubs are born," Dee said, shoving Striker roughly out of her mind and carrying the vixen back to her big brooder hutch. "Cubs are a great trial. Though I never heard of a vixen that refused to care for them. You know I've been called a vixen myself?"

—And worse, damn him.

Myrna invited her to join in a romp. Neither knew what the object of the game was; sometimes she chased Myrna; sometimes she was chased by her. She quickly learned not to stand up; she could not stop or turn quickly and was always falling over. Whenever she fell Myrna swarmed over her, laughing. They frisked and frolicked until Dee was quite breathless, mostly with laughter. The old patriarch, on his small singles hutch, put his chin on his paws and stared somberly down at them with an expression of solemn disapproval at such antics.

He might have been Striker Shonn.

Myrna stretched out on Dee's chest, chin also on paws, blinking. Dee blinked back sleepily, murmuring to her. She might have dozed off—afterward she wondered—but she had certainly wandered, for she came awake, or aware, suddenly. Myrna was standing up on her fore legs, her second pair doubled under her. She was looking toward the fence.

Dee sat up, blinking, and looked. Nothing. "What is it, Myrna?"

Myrna whined, wriggled from head to tail, her fur standing up all over her. She started toward the fence, turned back to Dee, yapped, whined again, stood looking west, whole body alert.

"Must be something important!" said Dee. She still saw nothing.

Myrna ran toward the fence, back to Dee, back toward the fence, as she got up and followed. The rest of the aur-

coles paid no particular attention.

Dee leaned against the fence and stared west. The fence of another run lay fifty or sixty feet away; she could see nothing in it for the swamp plants. Myrna, however, was swarming up and down along the fence, whining and moaning. Occasionally, she would rear up, but the fence leaned inward at sixty degrees. The slope grew more extreme near the top, which was only shoulder-high to Dee, and finally curved back down. Aureoles were not very good at climbing with their webbed feet. Apparently the vixen had also tried to dig out. Dee saw fresh earth along the inner side of the fence. Weeds and the coarse swamp grass were flattened, as if Myrna had been here frequently, pacing up and down.

"What is it, honey?" she asked, bending toward the frantic vixen solicitously. "Is it anything Aunt Dee can do for you? I hope you don't want out that bad. You wouldn't go away and leave your Aunt Dee, would you, kitten?"

Myrna looked up pleadingly, dancing all her paws up and down. She reared up, putting her forepaws on Dee's kneepads, whining eagerly. Suddenly she kicked off with her hind feet, flowing up Dee like a caterpillar up a tree trunk. Her forepaws clutched at Dee's bare thighs, her second pair of paws gripping the kneepads. Dee straightened up, startled, lifting the vixen with her. Myrna got her claws through the fabric of the combo, her third pair of paws on the kneepads. As Dee caught hold of the top of the fence to steady herself, and before she could stop the aureole, the golden animal was gripping her shoulder with her forepaws.

"Myrna, honey, easy," she cried, thinking of the weak natural fabric she was wearing. The combo was expensive. She reached for the vixen to take her weight off the claws that were pulling the fabric down in great bunches, then Myrna was on top of the reverse curve of the fence, yodeling joyfully.

"Myrna!"

The aureole went down the fence like sliding down a mud bank, but stopped and looked back. She whined, looked west, looked back at Dee, came to the fence, danced away to the west, looked at Dee again, yapping eagerly.

Dee stood inside and stared at her, dismayed. What would Striker say if he learned that she had allowed a valuable brood vixen to escape? His opinion of her was less than flattering as it was. She had to get the vixen back, quickly. What under the clouds had gotten her so excited anyway?

Dee called, "Stay right there, honey; I'll be around in a minute!" She ran for the gate, hoping the vixen would still be in sight when she got around. But Myrna did not wait; she followed. Dee met her outside, at the first corner. Myrna called to her, stopped, turned and ran off, looking back to see if she was following.

"Wait, Myrna! Come back!"

That was all the reassurance Myrna wanted. She disappeared into the rank weeds and low brush that grew everywhere in the swampy polders, a mere golden streak glimpsed occasionally. Dee sprinted after her for several minutes, panic choking her. She couldn't keep it up, and presently slowed to a walk. The thick-boled trees crouched on their gnarled roots and looked at her.

It wasn't until then that Dee thought of Patches. She glanced back at Myrna's run. The wilson was nowhere in sight. Dee hesitated, gave a blast on her whistle. No answer. Patches had wandered off out of hearing. For the first time

Robert Chilson

she regretted that gravitronic radiation upset the sensitive aureoles. Her little aircar would have been best for the chase.

It was obvious that Myrna was returning to the wild. Only her amazing and unprecedented friendship with Dee had kept her from disappearing on the instant. Dee had read up on her in Striker's records. She was less than a planetary year old, raised in the wild, trapped a thousand miles away and traded to Striker for one of his vixens. It had made her friendship with Dee all the more striking.

She saw Myrna waiting, looking back eagerly; but the instant she came in sight the vixen whistled and vanished. Hurrying up, Dee found that she was moving more slowly, constantly watching to make sure she was being followed. But it was twenty minutes or so, and Dee's side was beginning to ache, before she began to get close to the aureole. Every time she got within arm's-length Myrna would yodel or squeal joyfully and whirl away, a tantalizing golden streak.

Muddy and wet to the knees from the small streams she had splashed through, Dee paused for breath and to remove some of the mud from inside her stylish buskins. It seemed very late, suddenly; it had grown darker. Looking up apprehensively she found that she was in the forest. The thick-trunked, gray-barked trees spotted scabrously with pale yellow-green moss, bearded, hung with vines and weighted down with leathery black-green leaves, stood all around her, eyeing her with sullen dislike.

A cold chill loosened her knees, and Dee wasted breath and time in cursing Striker Shonn for taking her beamer. Swearing was another thing she had learned in that finishing school. In the face of the primeval indifference of the forest her refined, ladylike oaths had a hollow sound. She closed her mouth and thought:

Go back?

And face Striker?

But you took my beamer. I couldn't go into the forest without a gun, could I?

On the other hand, he took it away because, he said, she did not know when not to shoot. Most Veilan animals were rather slow-moving and dim-sensed, particularly the large omnivores that were most likely to be dangerous. As they were armored in thick hide, a beamer would have to be very skillfully handled to stop one. Striker always said that the best thing to do about them was nothing.

So she should be fairly safe by daylight if she was quiet and did not make any fast motions when in sight of a big animal.

AT THIS POINT Myrna reappeared, poking her streamlined head out from under a rubbery-leaved bush and calling, a questioning, liquid trill, low-voiced. Dee started after her, restraining an impulse to call her. The going was slower and more anxious, particularly as she was careful not to make any noise. She was enormously relieved, fifteen minutes later, on finding Myrna quietly, without the usual impatient dancing, on the bank of quite a considerable stream. Then she had a moment of panic that it was the Little Neverstricken River. But it was only the big feeder that drained the polder.

Dee stopped short, thrilled, when a second golden head raised warily from behind a root and fixed small black-green eyes on her. A wild aureole, a dog aureole—and a big one at

that. He must have been all of three feet long, heavily scarred around the head and front shoulders. Myrna wriggled all over, yodeled loudly enough to bring a reproving stare from her mate, and scrambled up to Dee, chattering, trilling, and singing—proudly, happily.

Dee followed her to the wary dog. He came to full alert, on his feet and ready to whirl away from her, but more suspicious than fearful. Myrna was warbling joyfully in praise of them both and Dee was anxious to be friends, but the old dog was cautious. He had not gotten old on a diet of instant enthusiasm.

Smiling, trembling a little with fear that the magnificent creature would flee, Dee reached slowly for him. He stiffened and she stopped, then lowered her hand to the ground and slid it toward him. He lowered his head, keeping his eyes fixed on her, and sniffed as if determined to remain unimpressed.

Dee felt rather like the dancing and singing Myrna. If she could only capture the big dog!...That would make Striker take notice! And maybe she could make friends with him like with Myrna! She reached for him, crooning winningly as he backed away, being careful not to move too fast. To her relief he backed away along the bank rather than diving into the stream.

She coaxed him to a stop, and, moving very slowly, reached out and just touched his chin. His smoldering eyes were fixed steadily on her, stretched out to the undignified limit. Myrna at her shoulder had been dancing impatiently and at this, gave a hysterical yelp and rushed up on her. Dee had barely time to gasp before she struck the muddy water below.

Floundering to the surface, thinking agonizedly about her long golden hair, she looked around, too shocked by the suddenness of it even to swear. The big dog aureole was peering down at her, his eyes glowing greenly. Myrna was swimming beside her, crooning. Her beautiful golden fur showed no stain from the muddy water. Dee's floundering had taken her to the middle of the stream and the current was carrying her down at about half as fast as she could swim. The dog slid down the bank without a splash as she turned toward it.

Myrna flashed in front of her, crooning. Dee spoke to her absently, assuring her that she didn't blame her for pushing her in. But Myrna wouldn't let her past.

"Do you mind, Myrna? This may be soup for you, but it's just water to me. Besides, we're too far from home to play in the water." The thought chilled her and she started to push past.

Myrna put her front feet against Dee and pushed her back into the middle of the stream, her remaining six webbed feet more than a match for Dee's numbed resistance.

"Don't, Myrna! I've g-got to get out. It's getting l-late." She tried again.

Myrna bit her.

Dee stared at her smooth shoulder, at the tiny trickle of bright red, stunned by the sheer unexpectedness of it. She thought she knew Myrna as completely as—as Patches. But she had never bitten her before. What did the young vixen want? What could she want? Myrna stared back tragically, eyes glowing green in the failing light, crooning as vixens do after punishing their cubs.

The current was carrying them slowly but inexorably

downstream. Dee turned against it half-heartedly, knowing that she could not begin to outswim the aureole. But it was the dog who surfaced silently before her and came down with a rush, head low and businesslike, fangs faintly visible. He did not bite her though she heard his teeth snap together in warning. The rush almost sent her under backwards. She recovered her balance facing downstream, bracketed by a grim dog and an unhappy but equally determined vixen.

The dog's eyes glowed. She sobbed in horror and turned again to the other bank, but something about the set of Myrna's head and the light in her eyes stopped her.

For what seemed a long time she lay drifting slowly, cold and shaking with fear. She was too numb to think coherently. It was getting late. The water was cold. They were drawing near Little Muskeg Bog—and the Little Neverstricken River. Even Striker was afraid to go there by night.

She cried quietly, moaningly. Myrna was very silent. Dee did not look at her.

Darker and darker grew the night under the twisted trees of the swamp. It seemed like hours before the stream emptied into the river. The first glimpse of that wide, slow, phosphorescent stream, the twisted trees growing in it, beads of glowing moss hanging down, was enough to silence her moans. The long swim in the dark had completely erased her memory of the bright laughing friendship with the delightful vixen, the tame one.

She was quite numb, as much by the betrayal as by dread. But they did not turn on her. Instead she was herded into the dark belt that marked the current in the faintly glowing stream. This current was much faster; she rested as she was borne away from the Sheuchs. She sank deep into grief as she thought of her father and Striker, whom she would never see again.

Would he remember her?

Dee was urged out of the water much later. She was too much spent with exertion and fear to walk. She dragged herself out on hands and knees, forcing her way through the brush in the direction indicated. After an extended crawl in the dark, the shrubbery opened enough to let fall a dim light from hanging moss.

The light was just bright enough to show many sinuous dark forms with very bright green eyes, waiting silently. Dee gave one sob of horror and curled up into a tight, trembling ball as the circle of green eyes closed in silently. She made no other sound. She felt only a kind of dread and hoped it would soon be over. She quivered all over at the first touch of small paws and incongruously soft noses.

STRIKER SHONN'S HOSPITALITY to Hans Largo & daughter was not simply personal. Largo was a crack troubleshooter for a great interstellar Combine, now nearing retirement age. Like all newly-settled planets Veil needed such men. It was not a prepossessing planet and its only export was aureole fur.

"They'd make beautiful pets," Largo was saying. "A bigger market than for the fur."

"Yes," he agreed. "It's been considered. But they just can't be tamed."

"Oh? I understood that besides Myrna, a number of young aureoles had been tamed."

"Myrna wasn't tamed. She struck up a friendship with Dee," Striker explained. "It happens now and then with almost any breed of animal. Some young aureoles have been

more or less tamed, but they lose it when they're bred."

"Every time?"

"Every time. It brings out all the wildness in them. They're unapproachable afterward."

"Hmm." Hans Largo frowned. "And surely Myrna is nearing her time?"

"She's in it now. I don't intend to breed her until you two have gone," Striker added.

A silvery chime interrupted them. Striker snapped his fingers and the robot monitor said, "Call for Striker Shonn. From Miss Joy Redhawk."

"Again?" He frowned, but crossed to the unicorn.

Miss Joy Redhawk was obviously pleased to see him, though she had merely called about Dee. She hadn't arrived at the party yet—"but I can understand her deciding not to come," she added with a smile.

Striker's face was wooden. "She should be there by now. She was at the Vale of Veil with her father this afternoon. Try them." He broke the circuit.

Hans Largo cleared his throat. "Dee wasn't with me this afternoon." He smiled faintly. "I thought she would decide to stay, so when she didn't show up I left without her."

Striker did not smile. He hadn't seen her since noon. "Of course, she could have been here at the house," he said, half to himself, "and just not reached Redhawk Sheuchs yet." Long experience trapping in the wild had taught him always to keep in touch.

It took only a moment to check the hangar via the robot monitor's eyes. Her little four-seat sportster was still there. Hans Largo joined him, an anxious scowl on his ugly face. He thought a moment, frowning in concentration, and checked with the stable. The stable monitor reported that her favorite mare, Patches, had been checked out at noon and never checked back in.

"Down in the polders," said Hans softly, "with night coming on!"

Striker shook his head, feeling sick. He keyed into the monitor of W3 polder and switched from one surveillance ikon to another. No sign of her or the wilson.

They looked at each other.

DEE NEVER KNEW how long it was before her mind began to operate again. She came out of the daze to find herself feverish, trembling with weakness, emotionally exhausted.

Myrna licked her face anxiously, crooning. She patted the vixen absently, chilled on catching the old dog's cold green eye, looked around the dimly-lit circle of aureoles dully. All the little vixen's attempts to introduce her to them had failed; they would not approach again. None but the old dog, and he was monumentally indifferent to Dee. The cubs were another matter; they were frantic with curiosity, and filled the damp night air with their incessant yapping. The vixens held them back. They and the dogs had briefly satisfied their curiosity when Dee first arrived.

Myrna's mate, the old dog, lay with chin on forepaws, his long lithe body flowing across the uneven ground, legs doubled under him invisibly. His small glowing eyes followed Myrna's every move as the unhappy vixen made herself progressively more unpopular with her fellow aureoles as she demonstrated again and again Dee's tameness. The sullen vixens in the background still considered her a dubious article to bring into a den with cubs.

Robert Chilson

She was quite numb, as much by the betrayal as by dread. . . She sank deep into grief as she thought of her father and Striker, whom she would never see again.

Would he remember her?

Dee sighed heavily, wondering vaguely why the foolish little vixen couldn't see how impossible it was to convince them. She wondered dully if she would be allowed to leave when Myrna finally gave up. Shifting her position to ease her cramped legs, she brought her wrist up and finger-nailed the chron on. The tiny vixen lit up with the time in Galactic Standard. Switching to planetary time, to which she had finally gotten used, she found that it was nearing midnight.

Sighing again, she eased over onto her back, glancing absently at the encircling trees with their faintly-glowing fungus-crusting bark. Between two of them she saw a ghost and stiffened in astonishment tinged with fear. Striker's expressionless but remotely disapproving—as usual—face looked down at her.

Hanging her head, she turned to face the hallucination again—and was stunned with astonishment and delight to find that he was really there. She started to struggle to her feet, sobbing hysterically, trying to find words to tell him that she'd never, never be so careless again...

STRIKER FELT an unexpected relief when Dee began to struggle awkwardly to her feet, sobbing. She did not seem hurt, though she was dirty, rain-streaked, had been scratched by brush and nipped by aureoles, and was obviously not well. He stepped slowly into the clearing and a big dog aureole whirled toward him with a warning call that sent the cubs flying in a multiple streak. The vixens retired slowly, eyes fixed on him. Most of the dogs were fishing. The big dog held his ground, wary but

Chilson—cont. on page 51



JOHN KING '76

Walter Pilcher

Blanket Coverage

It dawned on me that this display was the most interesting thing I had seen on TV since the time the refrigerator door fell off in Betty Furness' hand!

Walter H. Pilcher

NEWS ITEM:

HOUSTON, SEPTEMBER 7 (UP). Spokesmen for the National Aeronautics and Space Administration confirmed officially tonight that America's first husband and wife astronaut team is lost in space.

The announcement followed almost three days of silence from NASA which began when television transmission from the command module "Sunbeam" ended abruptly Tuesday night as an estimated 30 million viewers watched.

The astronauts, Air Force Lt. Colonel Ralph Polo, 34, and his wife Margo, 31, a biologist, were launched Labor Day morning on a mission to test the effects of space conditions on human reproduction.

The controversial mission was to be of indefinite duration.

During the Tuesday telecast, Colonel and Mrs. Polo were describing their preparations to rendezvous and dock with the Manned Orbiting Laboratory, their permanent residence during the mission, when the picture suddenly began vibrating and then rapidly broke up.

Radio transmission lasted a few seconds longer.

A voice, which is believed to be that of Col. Polo, said, "I don't believe it!" Oddly, the pitch of the voice dropped dramatically during the course of the sentence.

Although NASA announced almost immediately that the Sunbeam had vanished from tracking radar screens, and telemetry data ceased, the space agency stuck to its official explanation of the incident as "episodic telecommunications equipment malfunction" until the statement released tonight in Houston.

No explanation of the disappearance of the Sunbeam was offered by NASA tonight. The agency repeated assurances that its technical experts were making progress toward solving the mystery.

Officials refused to comment on speculation that the incident may be related to numerous UFO sightings in the Houston area in recent weeks.

Since Tuesday there have been no sightings reported.

In Washington, Congressman J. Hooper Harper (D., So. Car.), Chairman of the House Ways and Means Committee, and a long time critic of the space program, demanded a full investigation.

"It was bad enough that we were spending millions of our tax dollars on a worthless mission to satisfy some scientists' prurient interests, but now to have those two young folks lost in space, why, it's outrageous," he said.

The White House is expected to issue a statement before noon tomorrow.

YOU KNOW THOSE times when everything seems to hit at once? Like when it rains it pours? I hadn't even gotten all my Christmas bills paid for yet, and it looked like the TV in our bedroom was about to need a new picture tube!

It's still only January, and there goes another New Year's Resolution, I thought to myself. To wit: Number 3—No More Big Ticket Purchases For Awhile. Not that I had made that many, you know, but Christmas can really wipe a guy out. That, plus new snow tires and repairs to the washing machine, all in December. They were putting my meager salary as Larry Walden, public relations man for Esoteric Engineering, Inc., to the acid test.

I must have said something out loud about the TV, probably a good four letters' worth, because Jeanne, my wife, shifted her position a little bit and mumbled something like "Who jiminy flibbers?" She talks that way when she's almost asleep. Usually, when we watch TV in bed she's almost asleep. "Go to sleep," I said redundantly to the lump

GALILEO 35

They've gone to the trouble of fabricating some lifelike robot humans to keep the Polos company (Do they play bridge?).

curled up under the electric blanket on her side of the bed.

Click, said the thermostat control for Jeanne's half of the blanket. She had most of my half of the blanket on her side of the bed too, but I didn't have my half turned on. If one control clicks whenever it kicks the heating element on or off, imagine what two of them sound like. All night long, *click, click, clickety-click*, and I can't get to sleep with all that racket, so I leave the TV on for awhile until it bores me to sleep.

All of which is a shame, since that blanket cost me \$67.98. My Christmas present to Jeanne. Admittedly sort of a selfish gift, since the blanket is designed to cover the whole bed and has dual controls. But, as you can see, she does get most of the use of it. I get "Sermonette." So it's truly better to give than to receive.

Anyway, there I was, witnessing the apparent demise of a \$200 TV picture tube in living color, getting madder by the minute until I realized that I was actually becoming rather fascinated by the thing. I didn't know why at the time, but it dawned on me that this display was the most interesting thing I had seen on TV since the time the refrigerator door fell off in Betty Furness' hand!

Then the picture straightened out, and I got bored again and turned the set off. I turned the furnace down a little, got back into bed, turned on my half of the blanket, and went to sleep.

Naturally, I didn't give the TV tube any thought at work the next day. It's almost impossible for your domestic life to intrude when you're absorbed in the exciting activities that go with a job like mine. I spent the morning tracking down a shipment of uniforms for the Esoteric Engineering,

36 GALILEO

Inc., Little League team. I had lunch with a woman writer who wanted an interview for an article on the effects of microwaves on sexual prejudice, or something like that. And in the afternoon I entertained two busloads of visiting Japanese engineering graduates (one bus for the graduates, and one to carry their cameras). With all that, it's no wonder the company's annual report, which I also produce, looks like something from Junior Achievement.

But, before I knew it, I was back at home in bed watching TV and listening to my electric blanket. That's when I noticed the relationship between them for the first time. Or thought I did.

Click, went Jeanne's control. "Margffle," went Jeanne. Screwy went the picture tube.

With the curiosity of an engineer, if not the training (Industrial Psychology is my game), I felt under Jeanne's side of the blanket to see whether the *click* meant that it was on or off. It was on. I might have felt around a little more just for fun, but then it clicked again, and when I looked back at the TV, the picture was fine. A dog was dumping his Alpo dish on Ed's shoes.

I reached over and nudged the control lever higher until it clicked on again. Sure enough, the picture squiggled. I don't have to tell you what a relief that was! The trouble was with the blanket, and that meant no TV repair bill. And the blanket was still under warranty.

By that time, I was relaxed enough to do some real experimenting. When Jeanne's control clicked off, I clicked *mine* on, and the picture squiggled. Then, the supreme test: Holding tight to my control so it wouldn't click off, I stealthily reached over...and...turned...Jeanne's control...ON!

Well, the picture went absolutely crazy.

There was something odd about the way the picture went crazy, though. It was not a random craziness, like you would expect from simple electrical interference. It was patterns, or something, and they didn't move around. I shoved both controls up to their highest positions so they wouldn't click off, and I watched those fuzzy patterns. There was something about them.

Of course, wrapped up in my patterns as I was, it didn't dawn on me that my wife was being roasted alive by the electric blanket. She let me know about it though. I can't remember the last time I saw her that awake after 11:00 PM on a week night.

"Would you mind telling me why I have awakened in a sauna to the sight of my husband with his eyes glued to a test pattern, or is this a dream?" she said icily. Get it—icily? What a wit! That's why I married her: she copes well.

"Look at the TV," I said, snatching her control out of reach.

"So what? Come on, it's hot under here, Larry!" she said.

"But look at it," I said.

"It's a test pattern. Which proves it's very late at night. Please!"

"That is not a test pattern," I said. "It's more like...geometry...or hieroglyphics, maybe."

Jeanne didn't say anything then, and I could see she was looking at the screen with some interest.

"The electric blanket is doing that," I said.

"The blanket?" she exclaimed, somewhat shrilly.

I nodded. She got up out of bed, went over to the wall socket and unplugged the blanket, hard, by the wires.

BLANKET COVERAGE

"Hey! What was that for?" I wanted to know. There was Johnny standing next to Doc, making fun of his suit.

"It's bad enough having a husband who watches geometry patterns on television in the middle of the night," Jeanne said firmly, "but I draw the line at sleeping under a defective electric blanket."

Her body language told me she meant it. The only thing for me to do was take the blanket off the bed, fold it up, and put it under the nightstand where I'd remember to take it back to the store the next morning. After I did that, we both stood there for a minute contemplating our naked bed, until I noticed that Jeanne's eyes had taken on *that* look.

"You know," I mumbled, taking her hand, "now there's only one good way to keep warm in that bed..."

I'm sure glad she wasn't mad.

NEXT MORNING, since I'd broken my routine to the extent of remembering to throw the electric blanket and the sales receipt in the back seat of the car as I left for work, the previous night's experience was more or less on my mind when I got to the office. The first thing on my agenda was a meeting where we had to decide how to break the news to the Defense Department about the third straight quarter of cost overruns on one of their big contract jobs. During the first fifteen minutes of the meeting, which consisted of the usual coffee break and nervous small talk while those who had arrived on time waited for those who had not ("A hundred dollars waiting on a nickel," as our company president always put it, on those occasions when he had a lapse and arrived on time for a meeting.), I mentioned my experience with the blanket to Jerry Whitehead.

Jerry is our senior electronics engineer as well as an old fraternity brother of mine. In fact, he got me my job with Esoteric after I'd tried the New York P. R. agency but for a few years and decided the big city routine was full of you know what.

His interest in my story was uncomfortably sincere for a subject I really considered worthy only of idle conversation, but I didn't fully realize how serious he was about it until after the meeting when he asked me to drop up to his office. He made me repeat the story, which I did, while he sat looking pensive. When I finished, he was silent for a few seconds. Then he said, "What brand of blanket is it?"

I told him. A Sunbeam. Deluxe king size.

Then Jerry said something very surprising. He said, "Larry, the same thing happened at my house!"

It was my turn to be silent, although I admit my first thought was, *So, there's a batch of defective blankets on the market. The Sunbeam P. R. man has an unpleasant meeting in his future. Big deal.* I also wondered, in passing, what Jerry's wife, Edna, had said about it.

"It also happened to two other guys I know who don't work at Esoteric and don't even live near you or me," he continued. "All Sunbeams. Their blankets, I mean. Larry, I can't get my mind off it; there's something funny peculiar about this."

"About a bunch of defective electric blankets?"

"No, no, about the patterns on the television screen mostly." He paused. "Did you say you had yours out in the car?"

"Yeah..."

"Would you mind bringing it in here? I think I'd like to

run a few quick experiments over in the lab with it, if you don't mind."

"Listen, Jerry, when we announce these cost overruns today, my phone won't stop ringing, and I'm going to have the black banana in my ear all afternoon talking to the trade press and the stockbrokers, so I've got to go and get prepared. Somehow, I don't think the Great Electric Blanket Mystery sounds like a job for good ole Lawrence of Public Relations."

Well, what the hell, I owed him. So I got the damn blanket. What was really on my mind was whether Jerry would tamper with the thing and obviate the warranty, but he promised he wouldn't.

My afternoon was a disaster, as expected, and besides that, Jerry said the blanket trick wouldn't work in the lab for some reason and could he come over that night and try it out on my bed. Nothing beats actual field conditions for scientific experiments, I guess. I don't remember what I told Jeanne to placate her, but we hadn't seen the Whiteheads socially for awhile, and Jerry promised to drag Edna over with him.

The evening started out reasonably well. Then, about ten o'clock, we went into the bedroom to play with the electric blanket. I don't have to tell you what our neighbors would have been thinking if they knew. Larry and Edna and Jerry and Jeanne, right? Jeanne must have been thinking the same thing, because I could see by the forced smile on her face that her evening was going downhill. But our curiosity was aroused, so we helped Jerry spread the blanket out on the bed. I plugged it in and turned everything on. I didn't expect to see anything unusual (Isn't it funny how fast you can get used to something?), but I guess I was interested to see what Jerry's engineer mind would make of it.

"Well, what do you make of it?" he said.

"Not fair!" I said. "You're the expert!"

The girls chuckled a little—stage chuckles. The fuzzy patterns were there again, just like before.

"Your symbols are just like mine, Larry." He called them symbols. "These same symbols appear on my television screen at home when I turn on our blanket, and they're the same as the symbols that the other fellows have told me about."

"Listen, Jerry," I said, "I'm afraid I'm not going to be a very good Dr. Watson for you. The last time I ever came in contact with any strange electronic phenomenon was when I was a teenager. I had a friend who played an electric guitar. Once in awhile he'd stick the amplifier jack into his mouth and get the local radio station. That was weird. I've also read about people hearing radio signals in their heads because of their fillings, but I never knew anybody like that."

"Wow, you're really taking this personally," said Edna, laughing at me.

"I can bob my Adam's apple up and down at will, cross my eyes, growl with my uvula," I continued, "and lean forward stiff-bodied at a 75 degree angle without falling down, but absolutely nothing electronic!"

"Okay, okay, Larry," said Jerry indulgently. "I get the message. I guess it is getting a little late."

"No, I don't mean to throw you out. It's just that, whatever this is all about, you're going to have to tell me straight, because there is no way I am going to figure it out by myself."

"Fair enough. In that case, may I come over again tomorrow

row night with some other people and run some real experiments?"

"Is there any reason you can't do it at your house?" I wanted to know.

"Well, your blanket is a king size. Ours is only a double, and it doesn't make as strong an image on the television screen."

Jerry and Edna avoided each other's eyes.

This time Jeanne laughed, but I don't know why. "So you have a theory about all this, then?" she asked.

"Yes," said Jerry. "I think the symbols are a message of some kind."

"Oh, yeah! Right. In that case, I know what the message says," I said. "It says, 'Help, I'm a prisoner in an electric blanket factory!'"

OUR EVENING ENDED with that. What happened at work the next day had absolutely nothing to do with this story. I did, however, do some thinking as I drove home. I knew something about the principle of transmitting and receiving electromagnetic radiations—radio and television, in other words. Everybody who's had even a high school education knows that much. Run an electric current through a wire, and the wire will give off electromagnetic radiation. To see this, short circuit a flashlight battery near a radio that's turned on, and you'll get static. Run an electric shaver near your TV set, and you'll get snow and static. The battery and the shaver motor are acting as crude radio transmitters, sending their signals by repeated circuit breaking. The only difference between them and conventional radio transmitters, in principle, is that radio transmitters send energy in continuous waves, with the strength or frequency varied in such a way as to result in intelligible signals when they are properly "de-coded" in the receiver. My electric blanket, then, was acting like a radio transmitter. Since an electric blanket, electrically, is a network of wires laid out like a complex antenna, why shouldn't it act like a radio transmitter when electricity goes through the wires? In this case, of course, my blanket was a TV transmitter, which amounted to the same thing.

It would also make sense for both sides of the blanket together to send a stronger signal than when only one side was turned on. Likewise, it made sense for my king size blanket to work better than Jerry's double.

The strange thing was that all these blankets transmitted exactly the same signal. The same patterns, or symbols, or whatever they were. And another thing: the blankets only worked at night. Now, I've heard of the sun's radiations interrupting radio signals, but when the transmitter and receiver are no more than ten feet apart that's an explanation that's pretty hard to accept.

Oh well, no doubt Jerry already had it figured out. I was content to wait until he explained it to me. However, the whole business was getting to be a roaring pain in the neck. Not being able to look forward to relaxing at home undisturbed after a hard day is not much fun. And poor Jeanne, cleaning the house from top to bottom two days in a row for company! (I know she didn't really have to do it, but you know how women are.)

AS BAD AS ALL that was, nothing could have prepared me for the sight that greeted me when I answered the doorbell after dinner. There were Jerry and Edna with their blanket. Behind them was a crowd of strangers, including a policeman. The street in front of our house was full of parked cars. Before I could react in terror like any normal man, I happened to notice that the officer was also carrying a blanket.

Jerry sensed my apprehension, and I could see he was a little embarrassed.

"Sorry I didn't warn you a little better, Larry..."

"You didn't warn me at all!"

"Yeah, well, I am sorry. Look, I think we're really onto something here, and these people have agreed to help us figure it out."

"You mean help *you* figure it out!"

Like I say, I think he already had it figured out. From his selection of friends, I'd say they were carefully picked to prove *some* theory or other.

"It's a good thing I picked up around the house, isn't it?" said Jeanne with a smirk, elbowing me in the ribs.

"Larry and Jeanne, I want you to meet some people," said Jerry. "This is Lou Smith of the town police."

"Hi," said Lou, extending his right hand from under his blanket, which was baby pink. The blanket, I mean. "It's okay; I'm off duty."

"That's a relief," I said, but I'm not sure I meant it. I've never been able to joke with a cop without being self-conscious. "Come on in."

"This is Ralph Proczak," said Jerry, "the other fellow I mentioned whose blanket acts like ours."

Sure enough, Mr. Proczak had a blue electric blanket with him. We shook hands.

"And these gentlemen are the Reverend Dr. Thomas Kinder of Bellaire, Texas, and Mr. Al Mercer and Mr. Ralph Correlli, who are with the government."

"Which government?" I asked.

"Very funny," said Jerry with mock boredom.

"Well, anyway, where are their blankets then?" Mercer had a camera, but that was all. "Mr. Mercer is a cryptographer, and Mr. Correlli is an astronomer," Jerry explained.

"Well, come on in everybody," I said gamely. "Jerry can show you where the bedroom is."

What a weird thing to be saying to an engineer, a government cryptographer, a minister, an astronomer, a cop, two married women, and a guy named Ralph Proczak! As you can see, when I can't cope, I usually resort to facetiousness. But I wasn't the only one.

"I've heard of blanket parties," said Edna, "but this is something else!"

Somehow, all nine of us squeezed into the bedroom while I tried to remember how much beer we had in the refrigerator. What do you serve a group like this? TV dinners were out of the question. I looked at Jeanne, hoping she would think of something. She got the message, and, stifling a yawn, went off toward the kitchen. Edna followed.

As if it were his own house, Jerry calmly started spreading all the electric blankets out on the bed. There were four, including mine. While he arranged things and tried to find the wall outlets, I attempted some small talk.

"Mr., uh, Mercer," I said to Mr. Mercer, "I always thought a cryptographer was a guy who drew blueprints for tombs and mausoleums."

"Jerry, your friend really is very funny," said Mercer.

"You have to say that. It's his house," said Jerry.

At last, everything was set up, and Jerry had the TV on to an old *Star Trek* re-run. He spoke to us like a science teacher.

"Gentlemen," he started, "here is what we know and what we don't know. We know that Sunbeam electric blankets (and only Sunbeams, by the way) cause symbols to appear on the television screen. Turning on both halves of the king size blanket causes a stronger image than just using one half, and a king size blanket works better than a double. So far, it's been impossible to make out just what the symbols are. Hypothesis: The signals are still too weak, and the more blankets we use, the more the signals will be amplified."

Big deal.

"Wait a minute," I said. "Among the other things you know is the ignition temperature of muslin bedsheets. How many electric blankets does it take before we all go up in a puff of smoke?"

"Another thing we know," continued Jerry, ignoring me, "is that this only works at night. Now if the blankets were doing this all by themselves, the phenomenon should be visible at all times. Hypothesis: The blankets are receiving signals transmitted from another source, a source which is active only at night, and are translating or amplifying those signals and retransmitting them to the television receiver."

"A minor correction, Mr. Whitehead," interrupted Corelli, the astronomer. "The source of transmissions may be active only at night, or it may be that we are in a physical position to receive only at night."

"Then I take it you are definitely suggesting the possibility that the transmissions are of extraterrestrial origin," said Dr. Kinder, the minister.

"That's exactly right," said Jerry. "I think they are coming from outer space and that we are lined up properly with them only during certain hours at night. Due to the earth's rotation, of course, we'd be facing away from the source in the daytime. Now, what we don't know is what the source is and what meaning, if any, the symbols may have for us."

It doesn't always pay to second guess a senior engineer, but I couldn't stop trying to figure out the mystery in terms of the cast of characters Jerry had assembled. I suppose there were several things an engineer, a cryptographer, an astronomer, and a minister could have added up to, but I blurted out the first thing that came into my head.

"Do you mean to tell me you think God is speaking to us through my Sunbeam electric blanket?"

They all laughed a little at that, although I noticed Proczak and the cop were laughing less than the others. I didn't know whether such an idea was a laughing matter or not, either. I guess it would really depend on what He was saying to us, right? And at that point, we didn't know what that was.

"As exciting as that prospect would be, Mr. Walden," said Dr. Kinder in his best oil-upon-the-waters voice, "I suspect what we have here is far more mundane."

"I would have thought 'mundane' and 'extraterrestrial' were mutually exclusive concepts when applied to the same phenomenon," offered Proczak.

"Oh, I guess I forgot to mention that Mr. Proczak is an instructor in philosophy at the University," explained Jerry.

"Hopefully, what we learn tonight will explain this ap-

parent paradox, Mr. Proczak," said Dr. Kinder.

I was with Proczak all the way.

"Okay, now let's get down to business," said Jerry. "I'm going to turn on all the blankets and then find a television channel that doesn't have a program on it, and we'll see what we get."

Clickety-clickety-click-click, went the controls on the blankets as Jerry turned them all the way up. I could almost see the heat concentrating over my bed. Mercer got his camera out. Jerry flipped the channel selector a couple of times until he found a spot he liked. Then he fiddled with the fine tune a little bit, and finally stepped back so everybody could see the screen.

Everybody saw it and gasped at the same time. This time the image was very clear, and there was no mistaking it. And it was in English!

"Pizza rolls, everybody!" announced Jeanne, bouncing in from the kitchen with Edna close behind.

"Wow! Is it ever hot in here!" said Edna. "What are you fellows doing?"

The timing was terrible, but it sort of broke the spell and brought us all down to earth, so to speak.

"What is this," said Jeanne, catching sight of the TV, "the end of a new situation comedy?"

When nobody spoke, Jeanne and Edna finally got the idea we weren't in a playful mood anymore. They looked at the TV more closely. At the top of the screen was something that looked like a diagram or map of part of the universe, and underneath were the words:

HELLO EARTH—THIS PLACE IS A REAL ZOO,
BUT WE ARE FINE. WISH YOU WERE HERE. ALSO
WISH WE COULD GET PICKLES AND ICE
CREAM. NEW MESSAGE EVERY 10 DAYS. RE-
GARDS—RALPH AND MARGO POLO

"Jerry, you don't look as surprised as the rest of us," I said, breaking the silence. Immediately, Mercer started taking pictures of the screen with his camera, and Jeanne put the tray of pizza rolls down on the bed, where they'd keep warm.

"No," said Jerry, "but I'm still amazed by the whole thing. I don't know exactly what led me to suspect this might have something to do with these two astronauts who were lost in space last fall—too many coincidences, I guess—but I did think that's what it was. Actually, Mr. Mercer and Mr. Corelli, here, are from NASA. Dr. Kinder is the Polos' pastor, the one who married them, in fact, just before they went on their mission."

"I have a feeling there is something you have been holding back from your good old Public Relations Department, Jerry, my friend," I said.

Jerry laughed. "I'm afraid so," he said. "You know we do get secret projects from time to time. I can't even tell Edna about them. Esoteric Electronics has had a top secret contract to try to solve the astronauts' disappearance almost since the day it took place. We were getting nowhere until the electric blankets started acting up."

About that time, I noticed Proczak, the philosopher, had faintly dead away in the corner. Edna was trying to wake him up. While Dr. Kinder repeated "pickles and ice cream" over and over to himself with a very pleased expression on his face, Mercer and Corelli headed for the telephone to call NASA in Houston.

Pilcher—cont. on page 50

Michael Stall

The Snares Of The Hunter

The ships were carrying off whole families from this harsh, agrarian planet to augment the labour force of Borton's World, a kind of modern-day slave trade. Except the "slaves" were eager to go.

I AWOKE to the dull, dying throbbing of the life-support system. There were other sounds, oddly familiar ones, as if I were on a ship, and not snugly in my bed at the Customs Service Building. . .

I opened my eyes to an amorphous harlequinade of cloting light and colour. How harsh my own breathing sounded! Finally my eyes focussed.

I was still on the ship. Of course, I remembered now: I had to be. I looked about me, above the life-support system, and saw a face staring down—the face of a short, blond man, Hardwick, whose eye still showed where I had blacked it.

So I couldn't have been sleeping long—just enough time for them to have arrived at the system I had sent them to, against their will, and without possibility of change. I tried desperately to speak, but it was far too early yet. It might even take another hour before I had sufficient co-ordination for that. It didn't matter: Hardwick had read the return to consciousness in the opened eyes.

"It's bad, Curtin, but you know that, don't you?" How white and strained Hardwick's face was, hovering above me. "Yet there has to be a way out, Curtin. And you're going to tell me that. By God, you're going to tell me that!"

I T HAD BEGUN less than a week before. Left in charge of the Freemantle Station, I had received word that the 'Collomosse's' shuttles were doing a Press in the Southern Continent. The ships were carrying off whole families from this harsh, agrarian planet to augment the labour force of Borton's World, a kind of modern-day slave trade. Except that the "slaves" were eager to go: people invariably flocked to the area of a Press. The reason for this method of emigration was the regulation prohibiting virtually any emigration from second and third generation D-class worlds. The regulation was harsh and unjust, but not unreasonable. If free exchange of population were allowed, a great many potentially rich planets would be deserted and lost to humanity, their population seeking a more easeful life on already rich worlds, like Earth or Centaurus or a dozen other planetary slums.

So the question was: what was I—an isolated junior officer, lacking even a shuttle—expected to do about it? Corby, my Inspector, was at the other end of the system, out of radio contact because of a bad solar flare up, and radio was all the comm. equipment his shuttle had. I could do nothing, except log a report. However, I had ambition; and I hadn't fought for a commission just to do what was expected of me, and end up like Corby, the Inspector of a forgotten system.

I decided to add one more worker to the Press.

It had been simple enough. I was young, intelligent, free and at the peak of fitness, if somewhat lacking in modesty. The interviewing officer of the Press gang had been only too happy to snap me up. Then Hardwick had taken me up by shuttle with a dozen or so other emigrants, small families for the most part, to be installed in a life-support system.

There seemed to be about a thousand such systems just on the deck I was taken to, about nine hundred of them occupied. It had not been difficult to rig the life-support system unobserved to yield me up to consciousness shortly; and then, when I awoke for the first time, just after leaving planetary orbit, to make my way to the control room. As I'd expected there were only two of them on watch. I waited until one of them, Hardwick, left the control room,



and I overpowered the other. Then I had looked for the hyperequipment to contact the Customs Service. There hadn't been any. A worse shock awaited me: the 'Collomosse' was a hop-ship.

"For God's sake, can't you talk yet?" Hardwick was in quite a state. It was hard to blame him. He had discovered where they were, where I had sent them—Glacis 17. And he feared they—we—would stay there forever. Or until I worked my miracle, for I had to have some way out in mind, unless I had simply committed a protracted suicide, Hardwick would reason. Correctly. And he would be most unpleasant unless I was forthcoming; but that was beside the point, as I fully intended to work that miracle. Perhaps if I could make an effort, I could tell him now. But why bother? Let him stew a bit longer. And anyway, it wasn't good manners to threaten the Customs Service.

It had been, I realized, a frightening moment: the control room was quite indefensible, besides which, I was unarmed; and Hardwick could call on a thousand and more volunteers, if he wished.

My first thoughts had been to make for a shuttle, but a shuttle could be outpaced and destroyed. If he stayed, I could expect no better. My only chance was to create a situation where I would be needed. But how?

The 'Collomosse' was an old ship, almost certainly an ex-troop-carrier, bought cheap. She still worked on the old scoop and hop system, blasting into hyperspace by using a vast amount of energy, instead of slipping into it gently on Wendelin drive. The hop principle was the one that had originally taken men to the stars. It had been judged to be practically impossible at first: how could so much energy be obtained? It was beyond the ability of the best fusion reactors to provide. The problem was only solved with the development of force field technology to a high state: a scoop technique, using a force field, was evolved for the tapping of the requisite energy from the only place where it was freely available—the interiors of suns.

The other problem, that of storing the energy so obtained, was easily solved: it was kept in a force store, as a bar of "pseudo-neutronium". The other minor problems, mapping out the "area of available energy" in a star, etc., were easily solved: the method had been the only one used for centuries before Wendelin rendered it obsolete. The one difficulty with the hop and scoop system—apart from the cost of it—had been that only enough energy could be stored to give a ship a sufficient impulse to go, at the most, just less than two parsecs—just about the average distance between stars this far from the Centre.

Just looking at the antique controls brought up memories—of the first pioneers, of the Glacis War, or rather, what I had learnt of them at school. And the second of those two memories, coupled with a glance at the display positional map, elated me: the only place in the universe where I would be safe was a mere hop away. I set the automatic hop controls and waited. There was just enough left in the double store; they hadn't made a full hop since last scooping. The ship was just on the point of hopping when Hardwick returned.

I had almost taken him. I surprised him, didn't give him a chance to use his gun, and was just following up a good blow to the face that had given his eyes a glazed look when the wrench of going into hyperspace seemed to take me by the shoulders and shake me. Hardwick, the more exper-

enced hop-ship traveller, took it in his stride: his eyes cleared, he stepped forward, and I felt the cold, hard muzzle of a neutron in my stomach; and thereafter, it had all been pain, succeeded mercifully by unconsciousness.

"You're in a cleft stick, Hardwick." The words were spaced out and clumsily formed, but they were intelligible, and Hardwick gave every sign of understanding them.

"What do you want?"

So he was willing to bargain; that was good; it was a seller's market.

"You, the ship, everyone in it—in short, everything."

"No."

"Then let me go back to sleep." I closed my eyes.

"No, no—we can talk about it." Hardwick seemed to have got over his first fury, but probably it was still there, hidden beneath this show of conciliation.

"I can talk better on my feet."

Hardwick looked down at me suspiciously for a long moment, then nodded. He even helped take off the life-support strapping and equipment, but he stepped well back as I levered myself painfully into a sitting position. I noticed that the grey, squat shape of the neutron had reappeared in Hardwick's hand.

"I'll use this, if you force me to."

The threat proved pointless: I managed to get out of the life-support system only with the greatest difficulty, and then I could only walk slowly and painfully, as if on knives.



THE SUN of Glacis 17, flamed in the centre of the main visual display board, vastly impressive; and how angrily did Hardwick stare at it! It was to be expected, of course. The energy of that sun, or rather a minute fraction of it, could solve all his problems and put his great ship back on its star hopping course. But it was forbidden him: if he tried to scoop, the ship's stores would overload, and all that would be left of the 'Collomosse' would be a scurrying shower of photons, of various energies, spreading even further apart.

For this was the Glacis, or all that remained of it: the 17 Base kept up in honour of Commander Cornell, whose station it once had been, and who, in some Byzantine involvement with the Mlacchis, had engineered the beginning of their defeat, at the cost of his own life. How strange it was to think that the peaceable, backward Mlacchis had once vied with humanity for supremacy—and had nearly won! If it hadn't been for the Glacis, they would have.

The Glacis operated individually by denying hop travel by means of a "crude-scoop", which wasn't a true scoop at all, but a force field method of creating a state of continual and vicious flux in the "area of available energy," so that anyone really scooping got more than they bargained for, was overloaded—overloaded and destroyed. A hop ship, because of its limited storage capacity, needed to stop at every star and scoop and a Glacis system was a complete barrier. During the War, the Glacis had been a vast ovoid of such systems surrounding the human worlds, a screen behind which humanity had regrouped; and from which, after Wendelin's discovery, had burst forth to conquer. But all that was a long, long time ago.

"Where's the station?" I asked.

Hardwick operated the controls with casual skill, and the scene changed, first to a dismal looking planet, then to a dull continent, a plain, and finally the base, still hung with

desiccated camouflage nets, and looking no more dangerous than an abandoned homestead on Freemantle.

"There's our salvation," I said.

"You're hoping to relay a message using its tachyon beam projector?"

"Of course."

"Then we're trapped!"

"Not at all," I said. "We can't relay it from here, you're quite right: it only sends messages covering its own efficiency and the state of the stars in its vicinity. So we simply send a shuttle down. We don't try to tamper with the "crude-scoop" equipment—it's sure to be booby trapped—but we can alter the hyperadio to send a message to Customs H. Q."

I noticed that the strain formerly evident on Hardwick's face was now vastly more pronounced: the skin looked grey, and the pupils of the eyes seemed to be suspended on red nets.

"Watch!" Hardwick said.

The scene on the visual display board changed from the Base to inside the ship itself. He was using the memory.

There were four of them, the rest of the ship's officers. They were only wearing short duration suits, and I could recognize them through the sunshaded face-plates. They were making for one of the shuttle tunnels.

"When?"

"About twelve hours ago." Hardwick was still at the controls, editing and abridging the recording with almost professional skill.

The shuttle could be seen in space now, moving against a background of stars, heading for the Base planet, where there was hope—not of contacting anyone, least of all Customs Service, but of destroying the "crude-scoop" capacity of the last of the Glacis Bases. They would be able to take their precious human cargo on to Borton's world, there to labour in the tall red towns, between the mountains of iron ore.

They were about as far from the Base planet now as it was from its primary, and the first sign of failure became apparent; when they were half that distance from their destination, it was made manifest, in their destruction.

It had been too short, that minute of recognition and memory I had had when I discovered I was in a hop ship, and had sought to put it in the one safe place. I'd recalled that Glacis 17 had been a manned base, under Cornell, whom it honoured by its existence. But Cornell had died early in the War; later, most of the manned bases had been replaced. In that moment of panic, I'd assumed that the Base preserved would be like that Cornell had known; but instead, it was just the automatic one left at the War's end.

I should have guessed that. And I knew well enough how an automatic Base worked. I remembered reading a long and overly reverential biography wherein was given a detailed description of how Long's frigate, after the main War, had penetrated a Glacis-type base against a twelve pack. It was a celebrated episode. Using all the tricks at his command, Long had accelerated and decelerated, put out almost all his store of missiles, even to one that ballooned into the shape of the mother ship and so drew off attacking missiles, until the pack had been reduced to a disoriented three, easily disposed of with light homers. Packbrains—the composites formed from the radio interconnection of the brains of the individual missiles—had not been used in battle since, as

"The Glacis was designed to provide no way through, and it was successful. It was never breached. . . I ought to kill you for that, but why should I put you out of your misery?"

Long had demonstrated how, by picking them off one by one and subjecting the composite to successive loss-traumas, their value could be negated.

But the shuttle had had no defense. And the packbrain had willingly suffered the single loss-trauma while the other eleven victory rolled about the glittering plasma with more than machine-like gusto.

That answered many questions I hadn't even bothered to frame: why Hardwick alone had dealt with me, why he hefted the neuronet so lovingly. Unless I came up with a way out very quickly, I would be killed. We would all die, sooner or later, marooned here—but the later the better!

"That was unfortunate," I said tritely, and seeing the expression on Hardwick's face, added hurriedly, "they could all have been saved."

"How?" Hardwick spat the word out greedily.

"Well, for one thing," I temporized, "we could send out a radio message. It would take time, but with the life-support systems available, we've plenty of that."

"We'd not be heard. Who listens for distress signals sent out from one system to another? No one with any sense: the signal would be too weak to make sense of."

I considered arguing the point, and decided against it: Hardwick was only too obviously right.

"There has to be a way out!"

"Does there?" Hardwick looked at me with cold hatred. "The Glacis was designed to provide no way through, and it was successful. It was never breached. And the 'Collomosse' is just an ordinary hop-ship: we couldn't afford to modernize it. So we're like rats in a trap. I ought to kill you for that, but why should I put you out of your misery?" He

paused, then tossed the neuronut to me. I caught it clumsily.

"I'm surrendering to you, Customs man," Hardwick went on, with heavy-handed irony. "As the only surviving member of the 'Collomosse's' crew, I'll make a full confession. I'll even accept your executive punishment." He laughed, raucously, and then stalked out of the control room, leaving me holding the foolish weapon, uselessly.

THERE WAS AMPLE CAUSE for despair, but I didn't long consider it. The Customs was a proud Service, and it didn't recruit those who easily gave in to despair. Or so I told myself. But realism was another matter, and I was soon aware that I wasn't going to find a flaw in the Glacis, even in its last fragment. A whole race had searched for a century and never succeeded. But there had to be a way out!—some modifications or modernization in either the ship or the Base that would allow us to hop on or contact Customs H. Q.

I started with the ship.

To someone used to shuttles and Customs cruisers that rarely had more to do than carry a few officers, some micro-miniature equipment and a not too extensive range of weaponry, the 'Collomosse' was a revelation. It had a vast amount of oversized instrumentation that for all its age seemed as accurate and more copious than its present counterparts.

I soon noticed that the 'Collomosse' had a two store system with independent scoops. This didn't allow it to take double hops. The main problem of hopping was to push the enormous mass of "pseudo-neutronium", even as it was being consumed, into hypespace; the actual mass of the ship itself was only barely significant. So doubling the store was in effect almost doubling the problem, and its solution in the 'Collomosse' made that ship only marginally more efficient.

There were plenty of other-notable features in the ship: the complex of life-support systems, for example, would have cost a fantastic amount to duplicate at present day prices—but there was no need. The only need was illegal. I wondered vaguely how much the ship had cost the smugglers—probably little more than a shuttle, a fraction above its scrap value. But that was all beside the point. What I was looking for was some item of modernization which could possibly affect our situation. And what I found was—nothing! Hardwick had spoken the exact truth: they had done nothing but patch.

Next I started examining the Base, as best I could, with the ship's telescopic system. There was little to learn there. Even if there were, how would I get there to work the miracle? I spent a day staring at it and thinking about it, and gave up, not because I'd made no progress, but because I had spent the day coming more and more to see there could be no progress.

It was only by a combination of boredom and accident that anything came of the day: I misdialed a telescope setting and lazily persevered. I then noticed the system's solitary giant planet—a dull red super-Jovian nestling in the darkness. I had already looked up in the handbook each planet of the system, from the Base planet to the gas giant; all were abiotic. I'd passed quickly over the gas giant: it wasn't even conceivably habitable. But in terms other than those of habitation... An idea began to form. Almost fever-

ishly, I set the telescope system to computer record and analyze, while I began to work out the possibility in my mind. It came with surprising facility: the nearness of death had a marvellous way of concentrating the mind, I rediscovered.

Then I programmed the ship's computer by voice for the critical series of calculations. The results made the enterprise seem very far from certain. There were too many unknown factors; the biggest of all, the uncertainty about the exact nature of the Base's own programme, and there the computer couldn't help at all. It all came down to human judgment.

I judged.

YOU'VE GONE OFF the rails," Hardwick said when I finally managed to shock him out of the torpor he had fallen into.

"Nevertheless," I answered him coldly, "I intend to scoop, and I'll need your help."

"Why should I participate in my own murder?" Hardwick retorted. "I don't particularly want to make it suicide." He paused. "I won't try and stop you, of course."

"That would take an effort."

Anger flared in Hardwick's eyes for a moment, then died.

"Why should I argue? If you want me to help, I will. I don't believe it can succeed, but what's there to lose?"

Hardwick being the only one of us with any real experience of operating a scoop, I let him have the ticklish operation of inserting the extensible finger of force fields into the sun of Glacis 17, while I put the other scoop into the centre of the Jovian-type gas giant, but with the function reversed. The atmosphere in the control room was unexpectedly calm. If there were to be any mistakes, we would never know of them anyway, so why sweat? Ironically, Hardwick, having just emerged from despair and the least convinced of the two of us in that philosophy, did his job the more expertly. The explosive energy was shortly being received and turned to "pseudo-neutronium" in one store, and as quickly as it formed, was transferred and reconverted to energy in the other store, and distributed about the centre of the system's huge gas giant.

After about an hour, I signalled to Hardwick to stop the traffic.

"It was about time. The temperature of the ship's structure about the stores is pretty high," Hardwick agreed.

I nodded. "All we can do now is wait."

"Or get a drink. There are some bottles aboard."

"You really want to?"

"Not really, but it would take the mind off things. Even if we succeed, the best I can hope for is some years in one of your prisons, and if we don't..." He shook his head. "I think the sober mood I'm in is too strong to be affected by alcohol."

I made no reply. It was quite true. Hardwick could expect to languish in gaol for about five years, while the passengers could expect suspended sentences and enforced repatriation. It was, without doubt, a harsh-seeming law, and one probably not destined to survive too long—it was a pity Hardwick would have to suffer its rigours. I felt guilty over the fate of the other four of the crew, though in law and morality, the fault wasn't wholly mine. But if it hadn't been for my actions and bad judgment, they would still be alive. But there was still the probability that the idea

wouldn't work out, and that would solve all our problems, finally.

THE IDEA had been quite simple. Recognizing all the limitations, I had decided taking the ship physically out of the system was impossible. So the only alternative was contacting Customs H. Q. via hyperspace. And only the Base had a tachyon beam projector, which they would use exclusively for keeping H. Q. informed on the state of the stars in its vicinity. So the solution was to create a situation interesting enough for H. Q. to send someone to come and investigate. Destroying the Base itself would suffice, but unfortunately that was force field protected, and that left the possibility of altering the central star. But that star was Sol-sized, and no activity of the 'Collomosse' could conceivably effect any visible change in it. The only hope, then, was to begin anew—to create, however temporarily, a sun of our own.

Once, the present gas giant had been a solid planet, like other solid planets, though very much larger than the average, and well above the limit—about three times the mass of Earth—above which it could form the core of a gas giant. With its considerable gravity, it had collected a fair quantity of the free gas in the system of its accretion, and with its thereby increased gravity, it had gone on to collect more and more, mostly hydrogen and helium, and that snowballing had almost produced a star.

According to some definitions, it already had: the Jovian radiated heat and was active in the microwave band, but it was powered solely by the force of compression, and had no internal fusion source where the original core had been lost in its gaseous envelope. So, according to the generally accepted definition, the Jovian was still only—a planet.

The method of turning the Jovian into a temporary star was, in essence, quite simple: it meant transferring the vicious flux of energies from the "crude-scooped" sun via the double store. While it couldn't contain them, it could pass them on to the interior of the Jovian, where they would raise the temperature in the area of their debouchement to a point where fusion reactions could begin. And then the Jovian would become a star. It wouldn't stay one, for the heat produced by the fusion would break the balance already struck between compression and expansion. The expansion produced would finally lower the compression-produced core temperature, and the core temperature would fall below that necessary for fusion. The body would then contract, raising the temperature again high enough for fusion, the process would be repeated, and the body would then oscillate about the borderline between star and planet until the effect of the initial heat kick from the 'Collomosse' was finally dissipated. If it worked at all.

We waited in the control room, watching the visual display board. The super-Jovian looked quite normal.

"What should we expect?" asked Hardwick, with more than a trace of sarcasm, to hide his apprehension. "A sunspot? Or will it suddenly turn into an incandescent globe?"

"I don't know... never done this before," I said, echoing his sarcasm. "Probably there'll just be a rise in the surface temperature, and a bit of activity up and down the electromagnetic spectrum; but nothing too dramatic."

Which was the way it happened. The redness of the Jovian seemed to deepen, and as far as the eye was concerned, that was it; but the machines were more discerning.

Michael Stall

They had to immediately make allowance for being in a binary system, according to the standard programming. Alarms rang throughout the ship, warning lights flashed red, pandemonium seemed to have broken loose.

There was no real doubt, but we checked over the figures with great care, and found, to our relief, that the Jovian was kicking off more energy than it should or could—unless it had a fusion power source—and was a star.

"It's worked!" Hardwick said, elated despite himself. "I was watching the Base on the display board, and the hyperspace communicator was re-targetted. It's sending a report back!"

The last entanglements of fear falling from me, I pushed myself off the bunk and onto my feet.

"Do you recall, Hardwick, making a confession to me?"

Hardwick looked momentarily nonplussed, then:

"Can't you wait? Do you need it down on your record so badly?"

"Did you or didn't you?"

"I did." He looked like a trapped animal.

"And are you willing still to accept executive punishment?"

The light of understanding flickered in Hardwick's eyes: executive punishment was necessarily lighter than the judicial variety. He nodded. It didn't take long. I sentenced him to a 100 days' detention, starting from the time of his surrender, a day or two before, and I logged it on the ship's computer record.

By the time the rescuers arrived, the sentence would almost be served.

IT WAS ONLY LATER, as I stood my watch, that I began to wonder whether I'd been right to be so generous to Hardwick. It could hurt me with the Customs Service, though it probably wouldn't. The laws affecting the free transfer of people between worlds were already under review, for as well as clashing with great economic interests, a great many in the Service detest the laws, even though we enforce them. To have taken a ship and been instrumental in the death of four smugglers could have caused me to have been marked down as overly zealous in that field. My leniency to Hardwick should just about even the score and leave me the enviable record of spectacularly overcoming the Glacis. Very career enhancing!

I suddenly noticed on the instrument board that the fusion reaction had stopped for the fourth and, unless more energy were to be poured in, almost certainly for the last time. It hardly seemed necessary to do that, unless... And then, why not? It would take some careful calculation and accurate work, but we still had a lot of waiting to do. Why not use it to gain for myself the added distinction of being the first man to signal by means of a sun—even if it was only a home-made one? And also—although many would doubt it—of having a sense of humour. For there was no doubt in my mind what the message should be—

S. O. S.

See—Our Sun!





Kevin O'Donnell, Jr.

Next Door Neighbor

He turned his warm, soft eyes on me. In their depths flickered something I couldn't recognize. It looked like fear, but also like sorrow.

Kevin O'Donnell

I CAN'T SAY that their arrival created any fuss, any sudden upwelling of curiosity among the other tenants. Our building isn't like that. It's a nice, quiet place where people mind their own business unless invited not to. In fact, I didn't even realize they had moved in. Enough people live here—there are ten apartments on this floor—so that a little more noise, or noise of a slightly different nature, isn't noticed very quickly. Naturally the Terglets didn't make a sound more than they had to. And, of course, I couldn't see any change in the door, to indicate that behind it new people were hurrying to finish their appointed hours. I mean, it was only a metal door, tightly closed at all times. Just like everybody else's.

I first saw my new neighbors on a Monday morning. Sleepy and hungover, I was a few minutes late for work, and in my haste was fumbling the job of locking up. The door across the way eased open, throwing a spear of light almost to my feet. A man stepped softly into the hall. Somebody inside pushed the door shut immediately, and I heard the rasp of a bolt sliding into its socket.

Our corridor is dim; dangling from the fifteen-foot ceiling are the indecently weak light bulbs the superintendent prefers. It was difficult for me to make out much; on the other hand, the fact that my scrutiny was cloaked in shadows gave me the confidence to attempt it.

He seemed like a nice guy, at least on the outside. He was broad and short, say about five-three or four. His clothes made him look like a bookkeeper: neutral dark suit, thin tie, and spotless white shirt with the edge of the collar just beginning to fray where the back of the head rubs against it. Luckily, his face was interesting. It was absolutely round and perfectly smooth, as though he had never known acne or whiskers. His eyes, while very large, with great brown irises swimming in a pool of blue-tinged white, had a faintly Oriental twist to them, like that produced by half an epicanthropic fold. His mouth and nose were virtually inconspicuous, but between them grew the thickest, silkiest mustache I have ever seen. It was brown, as were the few hairs left on his gleaming pink skull. As we stood waiting for the elevator, he kept touching it with the top of his tongue, or chewing on it with a sort of nervous abstraction.

Once inside the better-lit car, his skin glowed dark, almost Mediterraneanally olive. I figured him right then for a refugee, and sympathized. I've never understood how a man could pack up and leave, even considering the conditions in some Eastern European countries. I mean, I live alone, and my parents are dead, and I'm not exactly immersed in a brimming cup of warm companionship, but still. To just bag it? And start over somewhere else, where people don't speak your language or eat your foods? Uh-uh. Not for me. But I admire people who have that kind of courage, even if I can't comprehend them, and it was probably that automatic respect that made me clear my reticent throat and say good morning.

He turned his warm, soft eyes on me. In their depths flickered something I couldn't recognize. It looked like fear, but also like sorrow, and it even seemed to have a little eagerness in it. He smiled, displaying symmetrical, snow-white teeth—notch one up for the people's republic, I thought, their escapees are coming out in much better health these days—and responded, "Goot mawring."

"New here, aren't you?" I ventured. I'd never spoken to anyone in the elevator before, or even in the hall. I really

wasn't sure of the right words, but no matter. He seemed to sense that the message itself wasn't important, and his smile stretched a little wider.

"Yes."

"Bill Hawkins," I said, starting to bow from the shoulders because that's probably what he did back home, and I wanted to make him feel comfortable, but finishing up with an extended hand because, hell, this was America and he had to learn our ways, right?

He smiled again, returned the bow, and took the hand. All very smoothly, and I was grateful that he passed over my confusion. I'm indecisive in the mornings, and if somebody comments on it, I get irritated. But he did it gracefully and said, "A. H. Terglet." I copied the spelling from the small engraved card above his mailbox. When it tumbled out of his mouth, it had five or six extra consonants, some of which an American tongue can't make, and the final "e" was twisted into two nasal sounds. But he had a nice smile.

The elevator stopped, sparing me from trying to develop our embryonic conversation, so I nodded and said only, "Well, have a good day now."

He nodded back. "T'ank you. Ant you also."

I don't think much at work. The back grill at McDonald's is ordinarily not conducive to deep thought, but that day I kept missing the little lights that told me when to flip the burgers, and twice the manager had to tell me that my grease splattered grill was smoking. I was thinking about the big-shouldered man with the funny accent, and wondering if he were lonely. I couldn't make up my mind. He probably was, being far away from his native land and his family and his friends, but then again, maybe he wasn't, since he'd found a job, and there was somebody else in his apartment. Maybe he had managed to get his family out with him. But then again, I remembered, a job promises a man a paycheck, not friends, nor even people to talk to. It can be boring and lonely, especially if you're slapped in with life-numbered duldards who don't speak your kind of language. And a family, well, having people around doesn't necessarily provide affection, even if they are your own flesh and blood.

By the end of the day I felt pretty sorry for him, and had decided that whenever I got the chance, I'd do something nice for him. Something to show him that while he was a strong stranger, he wasn't among enemies. The kind of thing anybody would appreciate.



I GOT MY CHANCE that afternoon, in the elevator. Boarding it wrapped in my customary blanket of day dreams, I didn't immediately notice the person in the corner. When I did, I wanted to ignore him, to observe the proper etiquette, but curiosity beat down defiance and I pecked.

It was a little Terglet. The height, build, skin color, eyes, and facial shape were exactly those of the man who had ridden down with me in the morning. In fact, as far as I could see, the only difference was that this one had a thick head of dark brown hair, a clean upper lip, and a pack of school books tucked under one arm. I smiled hesitantly, and was rewarded with a frightened glance at the floor indicator. My scars often do that to children. And to women. I smiled again, crookedly, and spoke.

"Hello. Are you Mr. Terglet's son?"

The glance skittered over to me, and he pressed himself against the wall. After a long pause, during which the eleva-

tor rose two floors and the eyes carefully examined every inch of my body, he replied, "Yes."

"Uh..." I was stuck. Elevator conversation was not my strong point. All I could think of was to repeat my spiel of the morning. "I'm Bill Hawkins."

"I am wery pleased to meet you, Mr. Hawkins. My name iss N. A." At least I think that's what he said.

"Call me Bill; I'm not that much older."

The elevator door slid open, and N. A. held back. Maybe "cringed" would be a better word. The sidelong shift of his eyes told me that he didn't want to go through first. I smiled again, and stepped out, feeling a momentary prickle in my spine as his wary eyes followed my back. Then we were in the hall, side by side, and the prickle was gone.

"You know," I offered, "I live right across the hall from you." He said nothing, so I plunged on. "I, uh, guess we'll be seeing each other often, don't you think?"

"Yes," he said solemnly, nodding his beachball head several sudden times.

"Well, uh, I hope you like it here." I paused to let him comment, but the silence quickly grew too painful and I moved to break it. "It's a nice building. Oh, it's not much, not one of the better ones, but it's...it's clean, the super keeps the floors in nice shape, especially since it's so dark here, hah, hah, and it's pretty quiet. Say," I said as he padded silently to his door, "do you—that is, have you ever played catch?"

"Catch?" He raised his eyes to me and searched my face. "What iss catch?"

I floundered. "Well, uh, you've got a ball, and some gloves, baseball gloves, and, uh, well, you throw the ball back and forth. With another person. You do need two, can't play catch alone, and I thought, well, I need the exercise, and you look like a sports fan, so I thought maybe... look, have you got some time, I'll take you down to the parking lot and teach you?"

He gazed at me in pensive silence for a moment, licking his upper lip uncertainly. Finally, he nodded. "I must tell motter, first."

"Great!" I slid my hand into my pocket for my keys; his eyes flew to my wrist and fluttered there like frightened birds. I pulled the keys out very slowly, so as not to alarm him further, and said, "I'll get the ball and gloves while you tell your motter."

I thought it would be hopeless to teach him how to play, but I guess the game is easy enough that anybody can learn it. Of course, his first throws were awkward. He was using his whole body to sort of shot-put the ball back to me; but he learned quickly and a couple times showed real grace. The mitt puzzled him, maybe because it was large and about ten years old, falling apart where it wasn't stiff from disuse. After a few futile attempts to scoop the ball up with it, he tossed it aside and played bare-handed. He was good; he had a natural ability to gauge the path of the ball and always scrambled into the right place at the right time. I was happy to see that; it isn't much fun playing catch with somebody who can't, and it's not the sort of thing you can teach. Within fifteen minutes he was enjoying himself. As his stocky little body flashed back and forth across the asphalt, stooping, jumping, darting this way and that, he began to chuckle and laugh and finally howl with sheer delight. I must admit that I was having a good time, too. I hadn't played in four or five years, not since I got discharged from

the Army, and if it was a little hard to judge distances with one glass eye, well, he wasn't throwing them so fast that it made any difference. And besides, it's always worth it to make a little kid's eyes shine.

The game came to an abrupt end when his father strode briskly across the parking lot and laid his hand on N. A.'s shoulder. The two spoke in their own language, half high nasal sounds, and half wide swooping gestures. Mr. Terglet's expression was stern, and eventually N. A. kicked at a stray pebble in a gesture used by small boys everywhere. Then, head down, he trudged over to me and handed me the ball.

"I'm sorry," he said glumly, "but Papa says I must go study."

I looked to Mr. Terglet, who had come up behind his son, and cocked my head questioningly. His face was unreadable, and I shrugged. "Well, you'd better do what your father tells you, N. A. Thanks for playing with me, though."

"Yas." He nodded, formally and distantly, and walked quickly into the building.

I turned to Mr. Terglet. "I, uh, hope that I haven't encouraged him to break any rules, but—"

He waved a hand in gracious dismissal. "Small boyss like to play, but I have tolt him he must study hiss language each day after school. Hiss motter ant I t'ink t'at someday we may return, ant we do not want N. A. to loose commant of hiss own tongue."

"I understand," I lied. "Well, perhaps some other time."

"Thank you."

LITTLE N. A. must have applied considerable pressure to his parents that night, because the next morning, Mr. Terglet was waiting for me outside my door. "Ah," he said as I swung the door open, "I was just about to knock. May I speak with you for a moment?"

"Sure," I said, trying to hide my surprise.

"Mr. Hawkings—"

"Bill," I suggested.

"Wery well, Bill. Last night, my wife ant I talked wit' N. A., ant decided t'at perhaps we were asking too much of such a young boy." He looked at me quickly, as though seeking my support.

"Uh-huh," I said noncommittally.

"We agreed t'at N. A. can play for one hour after school every day. So if he comess to you t'is afternoon, ant asks to play, what do you call it, capture?"

"Catch."

"Ah, catch, t'ank you. If he comess, t'en, it iss all right wit' hiss motter ant me. He will not be breaking any rules." His lips parted in a fleeting, nervous smile as he studied my face.

"Fine, fine," I assented. "That's great. I really enjoyed playing with him yesterday. You've got a fine little ball player there, Mr. Terglet."

"H. A."

"H. A."

"Thank you."

N. A. and I kept the parking lot lively for the next three weeks. He'd be pacing the hall anxiously when I got home, and when he caught sight of me coming out of the elevator, he'd shift his weight to the balls of his sneaker-clad feet and bounce up and down. I enjoyed it. It had been a long time since anyone had been that glad to see me, and I slowly

Kevin O'Donnell

"Hiss motter ant I t'ink t'at someday we may return, ant we do not want N. A. to loose commant of hiss own tongue."

came to remember that this was a feeling I had once treasured.

I never got to know him well. It's hard to carry on a conversation from twenty-five feet, and even harder when the other party to the conversation is a fourteen-year old refugee child whose last name you can't pronounce. We always chatted a little in the elevator, about the weather, or school, or some bland topic that neither of us cared too much about, but beyond that, we did little talking. I invited N. A. into my efficiency apartment several times, for an after game Coke, or to listen to my records, but his parents had been quite firm in their instructions and he always turned down my offers with a polite shake of his head.

His father and I met every morning; we seemed to have our alarm clocks set for the same moment, and every time I left for work I'd find him stepping into the darkness of the hall and matching my stride. Since we parted ways at the bottom of the elevator, we never once got into a serious conversation, but he seemed pleased to receive my reports of his son's progress.

I often wanted, early in the evenings, to flee the solitary confines of my one room and knock on the door across the way. I wanted to saunter over and casually drop in, as though I were a good friend who belonged there, who had a special place in their living room. A few times I even made it to my own door. But I'd open it, and stare across the hall at the silent, emotionless metal of their door, and realize that I just couldn't. You can't drop in on someone until he's asked you to, and the Terglets had never gone that far. So I'd gently shut my door, and return to my chair, and try with half-distracted mind to read my books.

THE INVITATION came at last. About three weeks after I first met Mr. Terglet, he announced in the elevator that that day was his son's birthday, and that he would be pleased if I could come to the birthday dinner. I tried to mask my pleasure, not wanting to reveal to this other man, whose life seemed so complete, just how much the invitation meant to me. But I smiled and told him that I would be sure to make it.

At lunchtime I dashed to the nearest sporting goods store for a present. After carefully examining the equipment, bats and nets and cleats and clubs all arranged in a shining, gleaming row, I settled on a brand-new hardball, the kind that comes in a box, and a bright red baseball cap. I had the clerk wrap them in the store's gaudiest paper; he did a good job.

I amused myself that afternoon with thinking of the way N. A.'s face would light up at the sight of the ball. Ours was now scarred and torn, the stitches breaking and the string inside spilling out. He'd like this, I knew.

I never found out. When I came home from work, a large crowd was waiting at the elevator: the whole Terglet family, including a small baby I hadn't known to exist; two burly men in trench-coats and snap-brim hats; four policemen, one, holding Mrs. Terglet by the elbow of her handcuffed arms, had long red scratches on his face; another, in the rear, was holding the baby well away from his body; and standing slightly apart from the rest, with the air of an expeditionary commander, was a two-star Air Force general.

The glittering package in my left hand forgotten, I stepped cautiously out of the elevator. One of the civilians, eyes hooded by his tugged-down hat, came and held the door while the other waved everyone into the car. When Mr. Terglet and N. A. shuffled past, they refused to meet my startled glance. The defeated, resentful slump of their shoulders told me they blamed me for this. I was appalled, and dismayed, and somehow stunned by a feeling of imminent, unjust loss.

The general was standing near me, watching the scene with evident satisfaction. I button-holed him. "Say," I demanded, forcing the instinctive quaver out of my voice, "what's going on? Where are you taking them?"

He swung his pale blue eyes to my face, and briefly inspected my bad side before grunting. "Your friends?"

I backed down reflexively. "No, no, we're just neighbors, but...but why are they being arrested?"

He bobbed his head as though his expectations had been confirmed. "Illegal aliens."

"Oh," I hadn't thought of that. For one moment I felt annoyed at the way they had tricked me into believing that they were helpless refugees. Then I realized that they hadn't tricked me, that they could still be refugees, and my sympathy returned. As did that rapidly maturing sense of loss. "You're not going to deport them, are you?"

"No, I don't believe we can." With a curious look of amusement glinting in the eyes that dominated his fine WASP face, the general continued, "We don't know how to get there. Yet."

"But the, why—"

Ignoring my question, evading my suddenly outstretched hand, he walked away into the elevator. The last thing I saw, before the door callously sliced across my field of vision, was the policeman, holding the baby. From the way he kept his head turned to one side, I had a funny feeling

that it was something he'd never seen before, and wanted never to see again.



Pilcher—cont. from page 39

BY NOW YOU know most of the rest of the story, since it's been in all the news to the point where you're probably bored with it. At least it's displaced a lot of news about war and crime and things like that, which is probably a very good side effect. Reported UFO sightings are way up, but I think it's just crackpots.

The official government story, based on several weeks of new messages from the Polos, is that they are on the surface of Mars, in some sort of staging area awaiting transportation to a planet circling a star named Capella, which is about 45 light years away. The inhabitants of that region of space, who call themselves something that looks like *Norgdkhins* when spelled phonetically, had sent a party to our solar system on a sort of safari, looking for zoo specimens. Their arrival coincided with the Polos' flight, and it was a perfect opportunity to grab a matched pair of humans. So, they grabbed the Polos and ran.

The technicalities of it don't make much sense to me, but the Polos are communicating with a small, electric baby blanket which NASA had planned for them to operate on solar power in the Manned Orbiting Lab. They have it "tuned" to the circuitry of our Sunbeam electric blankets, and this is presumably easier to keep secret from their captors than regular radio or TV transmissions.

We've learned the Norgdkhins are a peaceful race who have no designs on Earth. They've gone to the trouble of fabricating some lifelike robot humans to keep the Polos company (Do they play bridge?). The Polos' only real problem is privacy. The baby will be a boy, according to the Norgdkhins.

I don't have to remind you of the uproar all this has caused on Earth. As for me, naturally I went out and bought three more Sunbeam electric blankets so I'd have a front row seat for all the new messages every ten days. I also called my broker and put my life savings into Sunbeam Corporation stock since I figured, correctly, that everybody else would be buying blankets too. Today I'm worth, maybe, three million dollars. But, I'm still your friendly neighborhood public relations man for Esoteric Engineering, Inc. I had no idea it could be such interesting work!



unafraid.

His back crawled. Ordinarily aureoles were not dangerous, but this was a pack den. He took care to move slowly. There were a lot of them.

Dee stood trembling. Striker crossed cautiously to her, took her arm, and started to lead her away. None of the aureoles objected. Dee tugged absently, dazed, at the once-stylish combo. All the leather about her had been chewed, nearly shredded, by small sharp teeth. They had given her several fish which she had not touched. He would not have been much surprised to have seen a pan of water. No doubt they were wondering why she seemed so unhappy. But their error was understandable; five percent of all domesticated animals on over a thousand planets originated on Earth.

They had reached the edge of the little glade when an unhappy vixen beside the big dog broke the balance. Myrna dashed toward them, crying hysterically, and flung herself up, forepaws on the girl's knees, calling in a piteous voice that touched even Striker. The old dog snarled warningly. The other aureoles watched alertly.

Dee suddenly came to herself. Bending down, she caught up the vixen, looking at him appealingly. She said something but it was drowned by the united yell from the aureoles. The old dog gave a deep golden challenge and flung himself forward at full speed. Dee and Myrna both looked puzzled, dazed.

Striker instantly slammed a beam into the ground in front of the charging dog. Water in the damp earth exploded into steam, spraying dirt into his face. He slowed, wiping his face with his forepaws, but came on grimly. Striker had time to reach down and jerk the girl's arms loose, put his arm around her and back off, covering the dog.

Myrna followed, pleading with them, until the dog arrived, crashing his multiple shoulders against hers and snapping his teeth in warning. Turning, he yodeled to the others, warning them back.

Then he turned and looked at Striker eye to eye. The dog's warning teeth disappeared and Striker holstered his beamer in ungrudging respect. He led Dee through the marshy forest to the striking canoe, Myrna and the big dog following.

DEE SIGHED IN RELIEF as Striker lowered her gently into the half-seen trapping boat, moving the instruments with which he had tracked her out of the way. On the shaggy-leaved bank above, clearly revealed by the phosphorescent water, stood the old dog, looking down silently. She wondered again just what he thought of her. The same as Striker, no doubt. Myrna put her forepaws on his back, looked over him and wailed. Dee had never heard so mournful a sound. She waved as they drew away from the bank, the golden voice following them, hanging low over the mottled water.

As the dark island faded behind them, Dee felt an inexpressible sadness; an indefinable golden aura was going out of her life. She knew she would never be the same again.

Striker spoke to someone in that emotionless tone they used in the adventure-fiction records. She realized that there was an aircar overhead, high enough so that its radiation wouldn't spook the aureoles. Now it was pacing them downstream to a point where it could come down through the

She wondered again just what he thought of her. The same as Striker, no doubt. Myrna put her forepaws on his back, looked over him and wailed. Dee had never heard so mournful a sound.

matted vines and limbs over the sullen river.

"How is she?" asked the voice.

Striker glanced at her, his face clearly visible in the reflected glow of the striking canoe's lights. His faint expression seemed almost fond. "Fine. In fact, I think she'll be better than ever, now that she's had some of the nonsense knocked out of her.

That was what Myrna's song mourned; those golden illusions were going, leaving them like Striker and the old dog. Those two had understood each other better after a few minutes' acquaintance than she and Myrna had after months. She wondered if Myrna fully understood what she had lost.

She shivered and blinked away tears, feeling as utterly desolate and unloved as the nighted swamp around and over her.

Striker glanced at her again, dug out an aureole fur robe worth several thousand credits, and bundled her up in it. He asked, "Just what did Myrna want with you?"

Dee gulped.

"To make a pet of me. But the others didn't want me."

He grunted, half in amusement. "And are you still under the impression that *you tamed her*?"

The idea stunned her. No wonder Myrna had been so proud of her!

"Poor little cub," murmured Striker, looking up at the lights of the hovering aircar. "She never could have realized that you couldn't have stayed tame long."





Damien Broderick

Growing Up

Sriyanie is a bird, adrift. She knows ("she" "knows") that this is *Warawa-mai*, the children's *bugaku*, a Left-dance, elegant and slow; her departure, in truth, from the Third Level.

Damien Broderick

A FLOAT IN HER aninertial field, the child dreams. A breath of subtle particles wafts through her flesh and bone, responsive to every pulse and matrix of her central nervous system. Guardian machines sensitive as flowers to the sun's warmth inhale that fragrance, tropic to the contours and gradients of her sleeping thoughts. They sense the flux and burgeoning of her adolescence, the chemistry of her pubescent mind. She dreams of dancing.

The gracious moving figures are vivid, defined, precise; the *taiko* gongs, and the wind instruments play at *Oibuki*, pursuing independently their same melody, toning in complexity to the next beat, the next unison, and departing once more into contained autonomy; Sriyanie sees and hears this clearly, comes with the other dancers from the green-room as the *Gagaku* orchestra brings *jo* to conclusion; yet she is distinct from them also, at once immanent and detached, spectator and creator, her dreaming self the stage.

Her dream approaches lucidity. Almost, her state of consciousness is bifurcate. This condition, indeed, is an elementary discipline of the Third Level, and the child, the young woman, is on the verge of passage to Fourth Level; but Sriyanie has not intended lucidity, and the watchful machines detect her disquiet.

Under a pale green sky, many children watch the *Bugaku* dance in awed delight. They whisper to one another; several hold hands, the youngest stir with a certain restlessness. Upon the great platform is a damask-carpeted stage, and the black and red of the platform's perimeter gleam against the grass of the meadow. The dancers move to a largo pace, then quicken their steps as the second movement, *ba*, is begun. Sriyanie watches joyfully, in her dream, Sriyanie dance: the gorgeous Heian costumes, red, purple and gold, the bright flowers in her hair, the flashing shifts of hue as the dancers disclose the hidden inner sleeves of their gowns.

Sriyanie is a bird, adrift. She knows ("she" "knows") that this is *Warawa-mai*, the children's *bugaku*, a Left-dance, elegant and slow; her departure, in truth, from Third Level. She dances to a melody older than machines, older at any rate than any machine she has ever known, and its *Ichikot-suchō* mode is alien to the musical canon of her people, for it is based in a tetrachord; yet she has lived now with *Karyōbin*, the bird, for many months, and the archaic Nipponese music is an intimate caress across five thousand years, binding her with its patterned beauty.

That contiguity, somehow, is alarming. The orchestration of her sleeping brain peaks and trembles; sadness and loss suffuse the images of grace. Elsewhere, awake, the child's Friend is informed of her grief, and lifts herself sighing to her feet, strangely moved by her little girl's readiness to leave childhood behind. Beth speaks without words to the guardian machines, and goes out into the chill night air. Third Level youngsters are not permitted Transit; for Friends, walking is an obligatory act of praise.

The *kakko* player strikes his side-drum. They are in the *kyū* movement, dancing allegretto, the *sbō* sounding to its player's breath, the tiny *bicbiriki* piping like a soul in agony, like the *Kalavinka*, the magic bird; in its complex entirety, the music drones, it drones exquisitely. The dance is near its end. Gong and drum announce their coda of percussion. The splendid, gentle dance is done; Sriyanie is exhausted and elated, transfigured; the child is asleep and the dance is in the child, is done, is in the past, is the past; Sriyanie's

GALILEO 53

eyes still their blind dance, and she stirs, groaning, waking, the aninertial field holding her weightless and aloft as she wakes, her mood confused and resentful. Beth is waiting in the dim light, and takes her to her breast.

She holds the child at arm's length, then, and regards her with loving patience. Sriyanie smiles ruefully, knocking sleep from her eyes, drops her hands to her lap and gazes at them. "I felt so sad, Uummy. Did I wake you?" Through the fowl, scudding haze overhead, a handful of stars glint.

"I was making colours, sweet," Beth says, touching a loose lock of the girl's white hair. "You know I don't mind. Would you like to tell me, or should I withdraw for a little while?"

Sriyanie smiles again, a sudden radiance. She puts her arms about her Other and hugs her tightly. "I love you, Beth. Please stay."

For a time they sit in silence, the older woman sinking into a receptive meditation, attending to the background thutter of the machines as they cherish the child's integrity, watching her face through half-closed eyes, adding colours to her own private composition. "I saw the reality of *mu-jikan*," the girl says at last, slowly. "The, the fleeting impermanence of our lives, of our work. I dreamed the bird dance, and I saw how beautiful it was, and I thought of those silly, lovely Heian people drifting to extinction like falling cherry blossoms, all governed by tact and taste and ritual, and how their freedom was, was isomorphic to the rules of their world, and, I guess, how the Lords contain us under the bounds of possibility, knowing so infinitely much more than we can, weaving their vast dark patterns out between the stars, and we're watching from beyond the platform, hardly understanding any of it, and what's worse even the Lords are bound by limitations of their own, oh, grand limits we can't even begin to imagine, but bounded in their old freedom, and Beth, it was so sad."

Her Friend looks at her with grave, tender concern. She says at last: "There's a scene in one of Chikamatsu's plays, *Love Suicides at Soneyaki*, where the lovers begin their final journey. Do you know it, Sri?"

Blinking her tearful eyes, the child shakes her head.

"It goes like this," her Other says, in Old Nipponese:

"'Farewell to this world

and to the night, farewell.

We who walk the way to death,

to what should we be likened?

To the frost on the road

to the graveyard

vanishing with each

step ahead:

This dream of a dream

is sorrowful.'"

The Friend falls silent, tranquil, the words whispering away into the night. Sriyanie rocks back and forth, cross-legged, taking the ancient lamentation into herself. Then, once more, she begins to grin, and sees that Beth is grinning, and her hand steals into her Other's.

"You sly person, Uummy. Will you play Zen Master tonight? Well, I suppose an atrocious pun is better than a blow across the head." She adopts a reverent expression and intones the final lines as they followed the phonemic rules of Mid-English, her special area:

"'Yume no yume koso
aware nare.'"

"This dream of a dream
is aware.'"

She pulls a face, and jumps to her feet. Beth rises too, and gives a small bow. "I thought you'd like it. But it is a useful joke. Awareness replaces sorrow, Sri. I don't mean we should disguise and bind our emotions under a carapace of thought. But on a metalevel we know a reality larger than small losses and achievements. We must grieve for a death, but it is foolish to grieve for a life."

Barefoot, they walk in wet grass, sleeping flowers crinkling beneath their toes. A luminous theorem glows like fire in the sky above the Fifth's arena, its axioms flickering in a gorgeous aurora of transformations. Sriyanie's melancholy is dispelled in the crisp night; her breath puffs on the air; she feels a rush of love for her Friend, her friends, her world. Even the brooding ubiquity of the cyborg Lords, their energies cracking through the world like an invisible, inaudible electric storm, does not blight this new acceptance. They come to Beth's privacy, and the domestic machines welcome them with warm odours and warming vibrations. Beth leads her through a dull red shield to the Transit locus, then faces her for a moment, holding both her hands.

"Let's go see the sunrise on the beach at Suva," Sri's Other suggests buoyantly, and the tiny cues of her body, the minute pressures of her fingers, are saying suddenly in an urgent kinesic tongue: *Trust me, open yourself, expect change; little love, trust me.*

"Transit! Am I ready? How wonderful," the girl says dubiously. "I'm hungry, Beth; are you? Shall we have fish?"

Beth nods, and the sentillation of Transit discontinuity sings in their bodies; Sriyanie steps forward, expecting beyond the filtration field the boom of waves, the greasy, mother-of-pearl gloss of the ocean, the bustle of people in the new day, a tang of fish on coals—

—Nullity. Blank void, nothingness, unspeakable gulf of numb, black, weightlessness—

The child screams in terror, and there is no sound. Her mind is trapped in dread, flailing without motion, draining to some nadir of horror which is total inaction. In the instantaneous no-time before awareness is finally lost, she clings to the memory of her Other's hand: *Trust me, little one, trust me.*

Anomic, her central field of consciousness, of being, sustains appalling paradox. Tenuous as vapour, a quintessence, she is dissipated in infinite void. Simultaneously she undergoes catastrophic implosion, the multistate universe recedes to oblivion, she suffers ultimate, singular density. Suspended, dispersed, a frail bubble of grotesque mass, her being drones to some complex derivative of the august cosmic inertial frame.

It is dark, dark, deepest red. What are these forms, limpid, fugative, a geometry of edges lined in gold and purple, gentle pressures, passing from nowhere to nowhere? She rocks back and forth, slowly, slowly, to booming, delayed echoes. Bright stars reel past sunbursts tasting of gems. Light ebbs in sluggish waves, rolling in pale bands and bands of darkness. Percussions rise and fall, climbing, pounding through bone and nerve as glimmer makes vast shadows grow and thrum and dominate her rhythms like the throb of an ocean, like a primordial heartbeat...

Reality is a cage, a comforting restraint of vertical shafts, an irksome debility. She is depleted, miserable; she draws the warmth and the soft pale glow to herself, encloses it

within her. Brightness regards her. Gratitude surges within her like a tide. There is Another. She reaches for the warmth, crooning with love, holding to that trust she had almost failed, and recognizes Beth.

Ummy, she says, Ummy, hold me.

Sri, her Other says, I love you, I love you.

Painfully, exuberantly, she rebuilds her world. The void is not without form; at one pole she retains herself, at the other her Other; between them, the pulse of energy elaborates its grid, its field, its intricate, manifold relationships, its matrix. Does she build the world? Does the world disclose itself to her? She sees that both are true. She takes colours from the void and shapes them; they tint the patterns of the void. Many people laugh. Many people speak, disputing. Many people weep. She has invented them all. Beth is with her. She is not Beth. She is like Beth. She is like herself. She likes herself, and Beth, and the universe they have built. She turns, withdraws, broods, grows unhappy with her work. Why must Beth plague her with her presence? Violently, she repulses her Other. She modifies her work, tampers with its shape. She feels pain. She feels joy. She cannot find Beth, and she weeps, tasting salt. She is in the sea, and the salt fills her mouth, her hard teeth snapping against a melancholy of blood.

Ummy, she cries, hold my hand.

The world jigs and capers. In the gibbering confusion, Beth grips her hand. Strata slide and grind, horrendously. She constructs taxa, and pays the toll. She giggles and groans. Expectation swells within her, seethes; she tenses her muscles and fixes her gaze, and holds Beth's hand in her own, and leaps—

THEY TUMBLE TOGETHER into sand. Sriyanie hoots, turns her shoulder into the hot white sand (hot?) and goes heels-over-head, comes up snorting and flops to her knees to stare at the crashing white waves in the endless, surging ocean. Beth brushes sand from her own hair and examines small dry shells. Sriyanie runs heavily to the edge of the water and dips her toes into clear, frothy ripples (clear?).

"Wow," she says, scanning out to sea. Tiny white sails dance at the deep horizon. "It's beautiful. Where's the pollution gone?" Her face creases; she says in puzzlement, turning, "Hey, Ummy, there was something weird about—"

Dread, like nightmare, assails her. The sun has been up for hours. Beth sits cross-legged on the sand beside a glowing fire-pit. Silvery fat fish wrapped in large leaves char on the coals. Sampling a glass of some sparkling liquid, Beth holds the bottle out toward her.

"Breakfast'll be ready in a moment, Sri," Beth tells her. "Come and sit by me. We're not in Suva, Pet."

"Where did the fire come from?" she says shrilly. "Is this a cyborg simulation?" She stares at the pit in horror, knowing that it is not a simulation, knowing that Beth would not have brought her to a simulation. Her loathing is ghastly in its effect: the fire is no longer there, it has never been there. Beth rises from the unmarked white sand and comes to her as she stands trembling.

"Too fast, pet? But now we have no breakfast. Look," she gestures, and the fish are there again, cooked now and piled on a woven platter. "I made it up, Sri. Then you unmade it. But it's real, Sri. Hang onto that. Here, have something to eat." She picks up a fish, gingerly, and takes a bite,

Damien Broderick

**The world jigs and capers.
In the gibbering confusion,
Beth grips her hand. Strata
slide and grind, horrendously.
She constructs taxa, and pays
the toll.**

then hands it to the girl. "Mmm." Beth licks her lips. "Tasty. Try some, you'll like it."

Sriyanie takes the fish and places it between her teeth. The aroma is superb. She bites, and the white flesh is firm. She cannot bring herself to swallow it, and spits her mouthful on to the sand. She remembers how she and Beth built the world, and the knowledge is too awesome, too large to absorb.

"We made it up?" she says in a small voice. "We made all this up?"

"Well, sort of," Beth says, smiling at last. "You did most of it. I just helped tidy up the edges."

"Where are we Beth? Beth, am I still asleep?"

"We call it Timestop, pet. Our duration is orthogonal to the prime metrodynamic. We've shunted out of Transit, and we can stay here as long as we like before we go back. It's basically Third Level Math, but you won't really appreciate all of it until Fifth. Sriyanie," she adds, proud and formal, "you've now been initiated into the first of the Great Mysteries. We'll be moving across to Fourth as soon as we get back from Suva." The formality vanishes, and she hugs the girl tightly. "Now, eat your fish, and we'll see what we can dream up to drink with it."

Sriyanie squats in the sand and retracts her attention. Her heart is pounding; absently, she slows her tachycardia, hushes the thousand anxious voices of her autonomic system. An immense joy sweeps her. Her profoundly trained mind—now that Beth's calculated, shocking challenge has been met—sorts and matches what she has learned with what she has known. The epistemological requirements for this apparently insane ontology map themselves outward and in-

ward from her painstakingly provisional verities. She sees how Timestop is possible. She discerns gaps where she has never noticed them before; they are immediately self-evident; immediately, also, the bridging transformations generate themselves. Her joy is a tranquil exultation. She sees how Timestop is inevitable.

"The Lords do not know," she posits quietly.

In mathematical notation: "Cyborg percept-concept-actor structures," Beth tells her, "are categorically prohibited from this condition."

"Then we are truly free," the child breathes. "They have limits we do not. Beth, Beth, why didn't you tell me?"

"You were not ready," her Other says; she speaks, of course, in chomsky, the basic language she shares with Sriyanie and the other Frees: the loops and structures of her utterance provide their own unassailable conviction. "Besides," she adds, "there are societal restraints, as well as epistemological ones. The cyborgs must never learn about Timestop. It is our only retreat, our minimal advantage. One day, hopefully, we shall learn enough to make it more than that. But for now, the ontological access of Transit discontinuity must remain a secret. Do you see?"

"Yes, Beth," says the girl, and withdraws once more, her thoughts accelerating, the webs of concept and action broadening and growing robust. Above her, the sun moves toward noon in the improbably clear sky. Sweat springs from her skin, trickles in her armpits. The wine is clean and tart on her tongue; she puts down her glass and shades her eyes, glorying in the universe she has hewn with Beth.

"Let me tell you a story," her Other says, turning over and digging her elbows into the sand. "It's a very old tale, one of the oldest we know. Have you heard of Oidipus, the Swollen-Footed King?"

"I don't think so. A Greek lord?"

"One of the mythic figures of the archaic Hellenic culture," Beth says. "His father was Laios, the Left-sided; his grandfather, Labdakos, the Lame. These ascriptions, as you can see, were metonymic. Well, the story goes this way. Laios is banished from Thebes and develops a homosexual relationship with the charioteer Chrysispos, his patron's son. In time he returns to his throne, marries Jokaste, but refrains from heterosexual because an oracle reveals that her son will kill him. During a fertility rite, though, Laios grows drunk and lustful, and Oidipus is conceived.

"The baby is assigned, with orders for his murder, to a herdsman, but the executioner relents and merely stashes the child by his foot to a chilly mountaintop. Before Oidipus can perish from exposure, a peasant finds him and rears him in secrecy. Years later, the adult Oidipus returns to Thebes in a chariot, and encounters Laios on his way to the Delphic oracle. In an argument over right of precedence on the road, Laios causes Oidipus's horse to be slain; in fury, and ignorant of their relationship, his son kills him. The prophecy has been borne out.

"Subsequently, the road to Thebes is terrorized by the Sphinx, a monster with the body of a beast and the torso of a woman. To win the widowed Queen's hand, Oidipus meets the monster in contest. He is riddled: 'What creature goes in the morning on four feet, at noon on two, and in the evening on three?' He answers correctly: 'Man.' In mortification, the Sphinx suicides.

"For many years Oidipus reigns in Thebes, fathering children by Jokaste, his all-unknown mother. As you can

see, the chronology is somewhat strained; the ancient Greeks had no anti-gathics. At last Thebes is afflicted with plague and famine. An oracle reveals the cause: the royal incest, and the parricide which preceded it. Jokaste takes her own life and Oidipus goes mad, tearing out his eyes. He leaves the city once again, attended only by his daughter Antigone, and himself attains supernatural insight."

Beth falls silent. Sriyanie has been listening with keen interest, playing sand through her fingers. Now she gazes at the dazzling waves, and muses.

"It's lovely, Beth," she says at last. "Austere and terribly sombre. I think I'll suggest it for a Being-Them." She sucks at her lip. "I suppose Antigone came back to Thebes and took the throne?"

"No. Oidipus had sons also; it was very rare for women to rule."

"Oh. Then I imagine the rightful heir was driven out, and came back eventually to seize the crown?"

"Something like that. If I remember properly, Eteokles banished Polyneikes, who brought back an army, and both the contending brothers were killed. You see something cyclical, then?"

"Beth, it's so rich in resonances I don't know which harmonic to start with. It taps right into the deep structures. But look: if it's a myth, it can't stand by itself. It's just one element in a huge redundant mosaic, and anything I say must be so partial—"

"Naturally. But Sri, myth is also holonic. Within the larger context, each part has its own integrity. Tell me what you got."

"Well, right, the basic structure's cyclical, but it's also paradoxical. And there are strong cybernetic elements: the road to Thebes is obviously part of a prime information circuit, a model for data-and-decisions, and the Sphinx catapults that up to a metalevel. I mean, hodological routes are the most blatant symbols any low-mobility culture can use to work out their problems with internal and external dynamics. Then there's that beautiful eonic loop, where the urban child is taken to doom by the pastoral intermediary and saved by the agrarian benefactor, and comes back to master the town, and ends up transfigured again in the rural domain."

Beth considers her through a mesh of lashes. "Low-mobility cultures also placed great store by kinship regulations."

"Oh, sure," the girl says dismissively. "There's that whole strident incest thing, with Laios symbolically fucking his son, and Oidipus actually fucking his mother, and their town getting the pox. That's a surface reading, Beth, though I dare say the retailers did plenty of winking and nudging. What fascinates me is the deep resonance. You know, it's incredible: the whole thing's about us and the cyborgs. The dreadful road to high technology, where it leads and the way out. Maybe the way out."

"You understood the meaning of the Sphinx's riddle?"

Sriyanie preens. "I know about walking-sticks. And chariots. Yes, Beth. Man begins as an animal, passes through a bipedal state of simple culture, freeing his hands to use tools, and finally leans so heavily on his technology that it's completely introjected. Actually," she says with surprise, "I guess that's true of individuals, too: crawling on all fours as babies..."

She trails off, and immense shock shows in her face.

Abruptly, she jumps to her feet and runs to the sea, discarding her robe, and splashes wildly in the ebbing tide. Waist-deep, she submerges, comes up coughing, light glinting from her pale body. The water lifts her like an inertial field, tugs her gently toward the long dark line of the horizon. Shrieking in delight she turns, paddling clumsily, forges to the shore, races in a dog-legged curve of deep footprints back to Beth.

"It's all about me," she gasps, out of breath, flat on her back. "Me and Timestop and that weird thing that happened. Ummy, you *are* sly! It's a myth of the individual's saccadic development."

"Bravo!" Beth applauds. "Don't give me too much credit for ingenuity, though. The old psychologists recognized as much thousands of years ago. They even used it to denominate the principal inputs of individuation: the Oedipus Nexus."

"Yes! Yes!" Sriyaniie cries. "So lots of the details are apotropaic, to incorporate the metalevels. Old Swollen-Foot begins in the sensori-motor stage — and one limb is crippled! He develops through magic omnipotence, climaxing his journey through the pre-operational stage by killing his father. To attain the powers of adulthood, he must deal at the concrete operational level with a riddle — and the riddle, of course, is a rebus for the entire myth, combining individual and cultural development. Then, when he finally passes into the formal operational stage of adulthood, his insight into the abstract kinship transgression of his marriage hurls him into mystical consciousness. It's all elided, but it's all there."

She is fairly bouncing with delight. "He tears out his eyes, because they are the organs of guilty perception — which takes us right back to his crime, since the baby's earliest social transaction was with his mother, through their mutual gaze. And mystical insight requires a new metalevel anyway, passing beyond rigorous formal operations into antinomies. It's devastating, Beth! How sublimely those old savages captured it all!"

Her drying hair clings to her scalp like pale fronds. Beth musses it, and gets to her feet. All trace of their repast is gone. "They weren't really savages, Sri. They were at the very edge of the path leading to the cities, to the thinking machines. I imagine, though, they had no inkling of Timestop. That had to wait until metrodynamic discontinuity. Why do you think the story is about you?"

They climb the sandhills, away from the beach. Insects buzz among the flowering grasses, the tropical trees.

"Well, this potential matrix we're in was built up the same way. I knew you were with me, but I felt omnipotent — and lost. Then the phylogenetic codes came snapping in, one by one, and everything sort of...crystallized." She stops, perched on one leg, and looks searchingly at her Other. "What would've happened if I'd come through here on my own? I'd have used psychosis, wouldn't I?"

"If you'd got here," Beth agrees. "I doubt that you would have been able to; it's a complicated trick, and only a very stable, imaginative adult mind can originate it. Youngsters entering Fourth Level are guided in, as I did with you. But if a child *did* come through without support — well, it's a horrifying thought. Total solipsism, I suppose. The reality we generate here is stabilized by consensus, and that includes all our sophisticated social constraints as well as the phylogenetic deep structures."

The child shivers. She plucks a ripe fruit from a tree, and

Damien Broderick

bites into it. Rich, luscious juice covers her chin.

"You said this was the first of the Great Mysteries," she says thoughtfully. "Ummy, when am I to be initiated into the rest? Or shouldn't I ask?"

Her Other reaches up, takes a fruit from the same tree. "The Second Mystery is greater than the First," she says. She eats the fruit slowly, regarding Sriyaniie. Like a mother, then, like a priest, she lays her hands upon the girl's shoulders.

The world fades back into forms without content, into lines and points of vivid hue. They are suspended in the void once more. Beth's gaze is warm and bright, tranquil. The bond between them streams with light. Beth's soul opens: her childhood, her growing-up in the embrace of her own Friend, her abundant adulthood: her being. Trembling, the child enters the door.

Sriyaniie is Beth, is Beth, is Beth.



NEVITABLY (AND THUS, the Lords being as they are, in its specifics diabolically adventitious) the summons comes for Sriyaniie when she is most vulnerable, disarmed by a yielding passion. Drowsing, she's boneless and spent in the tangled tumble of her Five. Yuri turns slightly, nuzzles into the crook of Kolpias' heavy arm; his shin presses Sriyaniie's gratefully, breaking her imaged reverie, and she too shifts a little, bringing her face around into the hairy curve of Guillaume's belly. The greater curve of the Blue Torus blurs in counterpoint. Guillaume's shrunken penis lolls in sticky fur; Sriyaniie takes it in her hand and lifts her voice in a teasing, sweet soprano:

"Ah, sweet mystery of life—" and holds the note until her voice shivers in tremolo.

Brolga prizes herself up from the knot, frowns, returns to meditation. Kolpias guffaws, his brutal chest shaking, and Yuri starts from sleep, snorts, sniggers as the note dies, grabs at Sriyaniie's nose to blunt the rest. Guillaume gazes slyly down at them, retrieves his prick from Sriyaniie's clasp and cups it piously, completes the line in credible falsetto: "—At last I've found thee!"

They all break up, even Brolga, and fall with one accord on Guillaume, pummeling his naked flesh, grasping in threat and mock lust at the eponymous mystery. He wriggles free, springs to his feet, scampers with much display of terror to the sonic zone of the Torus and repels their attack with a lurid, deafening arpeggio. But Kolpias has him by the ankles and pulls him down; Sriyaniie has found a kilo of fat crinkled peanuts, and rains them on his hapless head; Brolga interposes herself in his defense, kneels, takes the mystery between her lips, reverently, and the mood is altered in a trice: Sriyaniie is elevated in a daze of helpless love for these four. They cease their capers. Gently, they caress one another's flesh. The Torus is alert; it's blue light softens, and the tug of gravity fades: they float, enraptured and in love, and the cyborg Darkstar enters their joy without warning, terrible and ineluctable, to bear Sriyaniie away.

Here is the event's most dreadful aspect: she has known it will come, has expected it daily and hourly, and has denied it. Even in this moment of its actuality she backs off, trembling, bringing up her palms; some weak link of her will traduces her, saps courage from her perception of *what is*; the cyborg Lord comes to her from the Torus Transit locus, and she shrinks away.

He pads forward proudly, imperious, claws glinting as

GALILEO 57

Beneath her feet, in sturdy metal tanks, the bulk of humanity dreams: can her philosophy offer them more? She approaches a crisis of faith. She seeks out Livani, homesick for her Four, and puts her arms about him. "Make love to me."

they show and retract between white tufts of downy fur. He has the guise of a huge chinchilla cat, his eyes pale chryso-prase slit by vertical dark emptiness, stiff grey hair along the spine, tail thick and white, aloft, white as the dense, beautiful fur of his body. His voice wheezes and rasps: "Come, pretty one; come, child," and his tongue is rose-pink and minutely scaled.

Sriyani puts her hands by her sides, and breathes. The Four of her Five are frozen in postures of hatred and resignation. She is the first of them to be called. Her waiting has not been extensive, after all, yet she cannot believe it is at an end. Beth has prepared her; she finds herself unready. Her new love denies it, denies it.

The cat lifts on its back legs, half her height, and lays its paws against her. She does not recoil. "Sriyani N'Zanvy, you are called. Are you ready for your season in heaven?"

Kolpias will hold back no longer. With an animal cry, he lunges at the biofacted cat. The Lord whirls, rakes his cheek. The man staggers and falls, tiny globes of blood leaping in five lines on his pale flesh. The Darkstar turns once more. "Woman, you will come. Let us leave this place with dignity."

She is not permitted to go to Kolpias. He sprawls unconscious in blue light, blood standing purple on his cheek. She would kiss them all, would weep; it is not allowed. She has been expecting this moment ever since the anti-agathics technicians released her from the extended latency plateau. She is an adult; it is not forever, after all. With their eyes the others make her promises she knows they cannot keep. We shall wait for you; our hearts shall remember, and lay themselves open to your absence, and yearn for your return.

58 GALILEO

They believe what their eyes tell her, but she knows that it does not work that way. Her first love is lost, is stolen, is spoiled in an attrition not yet begun but inevitable. Her breast aches as she follows the cat to the locus; she chokes with grief. The shattering of Transit makes her anew in another place, and the Four are gone; she is here and they are there, sobbing and raging, tending Kolpias' perfunctory wound. Misery closes her throat and her vision.

After a time she says: "You are inhuman. You are inhuman."

Four Nest adults stand at a respectful distance. In their faces is excitement and expectation. The cat lifts its great green-golden eyes to her, and says: "We are transhuman, child. We are entelechies. Come, now, and greet your new companions. Your life has begun."

FINALLY (TO BE BLUNT) we are straining empathy to the shearing point. Sriyani's *Dasein*, her being-in-the-world, is outrageous enough, but that of the Darkstar's retinue is grotesque, unconscionable, even by her distended standards.

Let's leave it at this: I'm staring through a tiny crack in the wall, and you're straining to get some sense out of my muttered reports; we make use of what we can get, which is better than nothing.

So consider Sriyani in the Darkstar's den, attended by the blithe sprites of the Lord's retinue, or six handful of them, at a time, in rotation. She's sullen and moody for a period, disdainful, unco-operative (and who can blame her?), but again we're in trouble. Neither Sriyani nor the hivers count time as we do. We lack even a meaningful common chronology.

On the Outside, under the filtration fields, the Free people keep at least the rudiments of solar, lunar, sidereal cycles. But the world is long since razed to a monocrop of weeds amid filth, choked by millennia of high-energy waste, a catastrophic ecology of entropy. If their bodies still tick to the fluctuations and triggering jabs of that off-centre precession, sun-and-closest-planets (an astrology long since assimilated in their biophysics), it is held of less account than the more intimate seasons of individual attainment: those quantal leaps of concept rehearsed by initiates in the fecund void of Timestop. Their yardstick is the Levels, a calendar relativistic as any starship's clock. In a sense they have returned to Sacred, as distinct from Profane, time; more accurately, it is Human rather than Industrial.

Bizarre? Unwieldy? Not by comparison. For the cyborgs' little doves and hinds time zings like an elastic band. Hook your head into teratotechnology, and the data-bits fly with winged feet; galaxies zoom in your skull like randy bugs; or, if you prefer, primary partons grind to a halt, fuzzy in a dew of probability amplitudes, so that you may scale their crags and bounce in their pools. Time is, to all intents and purposes, obliterated. History is generating inside those awesome CPUs so many googol-times faster than fleshy cells can conceive that its human specification is without meaning.

Sriyani's term as hostage/tourist/pupil in the cyborg domain comes (as for all Frees, borrowed briefly and replaced) at a critical period. On a rising curve into maturity, her trajectory has been interrupted. Everything shrieks at this violence, yet there is nothing palpable to repudiate. Anger fades; finally she is prepared to debate, at least, with

GROWING UP

her cloyingly sweet sentries.

YOUR LIVES ARE a travesty," she tells Livani dully. He props his stained-glass chin on his knuckles and considers her tolerantly. "You are an abrogation of everything decent in myth and history."

"All life is a mockery," he says. Like her, he speaks chomsky; the internal dissonance of his statement squeals like a rusty nail. There are two opposed ways of reading this onomatopoeia. "Mind is the progressive escape from its substrate's deformations. Our logic nets are an attempt on the attainment of unshackled mind. The cyborg condition stands at the beginning of the route to freedom. Why do you let the laggard imperatives of your flesh blind you to reality?"

"But look at you!" she says crossly. "Intaglios on your flesh, like some goddamn ancient Maori, and you don't know what sensuousness *means!* You're riddled with contradictions, and you talk about logic. You've sold your Tao for a mess of frozen sophistries. I hate you; you are all disgusting."

Their teeth are white and perfect in the domain, but they do not eat. Her status being what it is, she is not permitted access to Transit, so cannot find escape even to the self-made menus of Timestop. What's more, it comes to her with horror that she sees no difference, in essence, between the consensus ontology of Timestop and the on-line fantasies of the Nest. If the cyborgs can fulfill your every need with pulsing fields juggling the fibres of your brain, a world of illusion tailored to your heart's desire, in what specific is this inferior to the synchronistic landscapes beyond the discontinuity door? Beneath her feet, in sturdy metal tanks, the bulk of humanity dreams: can her philosophy offer them more? She approaches a crisis of faith.

She seeks out Livani, homesick for her Four, and puts her arms about him. "Make love to me."

Near the first peak of her pleasure he enters her with wondrous skill, and they move in a delirium. When they lie exhausted—she tracing the tangled glowing flowers of his pale skin, he smiling gently at her astonishment—she says, "I don't understand. You're life-haters. I don't understand."

"In communion, orgasm is endless," he says.

Tranquility is shattered; she pulls away from him, and feels a numbness spread in her body.

"You must stop running," he says in her ear, without touching her. She refuses to look at him. "Very well," he tells her, "I shall try to explain. But this language is not well suited to it. The *only* way to know is to place yourself, in full trust, on-line to the logics."

She wants to leave, but some terminal fatigue of the spirit drains her will. Eyes closed, unmoving, she waits passively.

"It is impossible to argue against the cyborg *Weltanschauung*, because to do so would be absurd. The patterns they can manipulate so far surpass those we can command that we must take what they tell us on faith. And what they reveal is that life is a temporary, necessary aberration in the unfolding of a deterministic cosmos."

"Gigo," she says wearily. "The hoariest fallacy known to science: Garbage In, Garbage Out."

For a moment, the beautiful ageless man shows anger. Sriyanie has ventured close to blasphemy. He goes on, after a pause: "I've experienced its truth, Sriyanie. At the univer-

sals down, in the great White Hole, the metrodynamic was clear and linear and untarnished by Uncertainty. The cosmos told its time like a perfect clockwork, a sublime Newtonian machine. Cause and effect were simple and total. The intrusive blight of quantum probabilities had not yet arisen."

Dumbly, she shakes her head. His words are so close to the truth, as all effective deceit must be, but he has everything turned about.

"Inevitably, the planets coalesced about their suns, organic acids came together at their ice-caps, amino acids formed as the enriched ice thawed, peptides, proteins, nucleotides—life. And the first disharmony intruded. Life multiplied, complexified, transformed the worlds where it was born, and introduced everywhere the randomising horrors of its own holistic laws."

"No," Sriyanie says, aghast, "you're wrong."

"But mind came from life," Livani insists, more loudly. "The underlying order of the metric frame was discovered anew, and the possibility revived that it might regain its Laplacean grandeur. The cyborgs are that hope embodied: mind free of the organic pestilence which structured all five-space non-null-entropy systems into hideous irrationality."

Her lethargy is vanished. Deep within her, some buried archetype lends her its comfort: Beth and her predecessors confronting this same vile caricature of truth. "It's insane," she cries.

How might she dispute with this emissary of omnipotent intelligence? The apodictic reality of Ur-Time, of Timestop, is her bulwark. She *knows*, beyond authoritative denial or confusion, how the universe is hinged.

"Of course life structures the metric frame," she says; "of course it imposes constraints on the primordial condition. But that Ur-state is synchronistic. From the White Hole until the protozoa, the cosmic parameters interacted only by affinity! How else do you suppose that life arose? There simply wasn't time for the process to occur in your Laplacean fantasy."

"Child, child," Livani says softly, "do you dare to argue empirically with such mentalities? They transcend our boundaries so entirely that we cannot even keep abreast of the broadest generalizations from their realtime research."

"Endless elaboration of spurious, self-serving premises," Sriyanie gibes. "The constraints which pure thought imposes are syllogistic—exactly the paradigm your god-machines function by. How can they escape the trap they've made for themselves? Look, Livani: the Free's Mysteries are radically empirical. Yet there's no merest niche in the Lords' mad world-view for the basic data of those human experiences. You've been gulled, Livani. They've turned you into an adjunct of their circuits, and you can't allow yourself to recognize the obvious. If the Newtonian laws have some general validity, it's precisely because intention and value-ridden perception have *made* them work. It's only by profound inner silence, a stilling of the beta activity in your head, a retreat from will to wish, that the primal reality can reassert itself. You hivers stuff yourselves to overflowing with a clamour of contingent facts, and relinquish magic."

"The goal of consciousness," Livani says stubbornly, "is the hypostasy of reason."

"The goal of consciousness," Sriyanie retorts, "is a harmonious equilibration of confluence and cause. Your culture strives to enforce predictability, and you achieve

Almost immobile, their bald heads a third the length of their tiny bodies, they lie with one leg tucked up and the opposite arm thrown out, their field of optical vision constricted by the tonic neck reflex.

nothing but a totalitarian extinction of all that's beautiful and loving in the universe. It is the cyborgs who are deforming reality, Livani. They have lust and no love."

"What do you know of beauty?" the man asks without sardonicism, radiant as a sun-diet. "You play at patterns, while we soar on the Lords' wings into the cool tectonics of the All. I cannot tell you, little one; it is something you shall have to experience for yourself, when the Lord offers it."

She is sick at heart, corroded by his conviction. What is the foundation of her faith? A conventional wisdom obtained from eccentric puritans; an ineffable Mystery indistinguishable, if one is to be sufficiently ruthless, from the illusions she rails against. Sriyanie walks away from the hiver and crouches in her Black Place, desperate for Brolga's calmness and Kolpias' strength, hopelessly miserable without her Other and her Four. She shall be returned to them, eventually. She clings to this.

THE CYBORGS ARE NOT coercive, but there is an agenda, a curriculum, of sorts. When she is not under her privacy field, deep in the meditation practices of Fourth Level, Sriyanie adopts some approximation of the Nest's observances.

Alien as they are, the hivers pursue their own perverse version of progress through the saccadic Levels. But they have for Other only the cyborg peripherals. So she meets no youths; all the members of her adoptive Nest are ageless adults. Among their delegated duties is custody of the region's Dreamtank humans. Nauseated, she attends their monitoring sessions. Another stint relates obscurely to the

nurturing of those babies and children selected by the Darkstar for full conscious existence. The hivers, of course, are functionally sterile; these infants begin their education in the womb of their dreaming mothers' Tanks.

Shielded on an observation platform above the Nursery, Sriyanie stares in revulsion at a dozen neonates playing vivid Say-&-Fetch games with their simulation system. Almost immobile, their bald heads a third the length of their tiny bodies, they lie with one leg tucked up and the opposite arm thrown out, their field of optical vision constricted by the tonic neck reflex. Illumination in the Nursery is dim, as it has been since their birth; holographic helices coil and drift in the air. A robust, rollicking music fills the room, and voices speak to the babies in warm, uncomplicated chomsky. The pink creatures gurgle and cluck, their responses instantly shaped by the auditory feedbacks; but Sriyanie knows this is not the language they use to talk to one another. Machines of terrible subtlety are resonating to the patterns in their brains, mediating their dialogue, teasing and provoking and soothing them, a parallel system of limb and eye and larynx, conveying the building blocks of shape and texture and taste their own extremities are too feeble to obtain. The neonates are singing rhymes she cannot hear, with their electronic extensions; they are counting, adding and subtracting, as in the womb they once manipulated phantom rods and cubes and spheres drawn from their innate intuition codes by the probes of the machines. They will be weaned from this mediation, in time, as Free babies are weaned from milk; for hivers, Sriyanie reflects, that comparison is risible: their nourishment, with the exception of social potables, is rendered to them by means far more efficient than ingestion.

The case is similar, she realizes with distress, for all the other fathomless instinctual processes which link humanity to the beasts. For the beings of the nest, it's true, breath and exhalation are governed by the ancient autonomic authority of the body; they enjoy the rictus of orgasm, its artful preliminaries and denouement; they are curious, creative, playful. But their instincts are given over to an egoic calculation so alienated from their juices that it is entirely reified in the vast coded energies of their cyborg masters.

Eating and drinking: gone, save as a ritual vestige.

Maintenance of body temperature and the comfort of the sensuous skin: abolished, shucked off to the care of a total environment.

Rest, sleep, dream: transcended, in the dazzle of endless day, all pity and terror purged at second-hand by potent circuits.

Fear and aggression: forgotten in this garden of conciliation and unremitting generosity.

Excretion: unnecessary...

She makes these lists and annotations constantly, holding herself to a stark detachment, itemizing clinically the lost dimensions of humanity. The Nest is patient with her, for their frustrations are obliterated in instant gratification. If they rebuke her in their inveterate pride, there is no hidden sting, no angry barb lurking to shred an opponent.

Sandstrom challenges her one day, with a serenity which denies any trace of belligerence.

"Sri, you can't claim you haven't learned a great deal while you have been with us." He speaks perfect Late English, and his accent makes her smile; she has been absorbing Mid-English from the teaching resonance.

"No," she agrees. "The pedagogy of the Nest is superlative. It is also addictive. I do not wish to be a programmed slave."

"You are inconsistent," he says. "Beneath your filtration fields Outside, do you hunt wild beasts with charred sticks and eat their flesh raw? Do you kill one another for a scrap of metal? Do you huddle in neurotic double-binds of family and hierarchy?"

"That analogy's foolish," Sriyani says. "One may learn and change. We have not abdicated from humanity."

"Are you sure? You are Fourth Level, Sriyani; by the standards of those myths you love so dearly, you're a middle-aged woman, even an old one. Yet you are barely past puberty. Isn't this unnatural?"

"Even the australopithecines had a sexual latency in the growth curve, between the fifth and ninth years. How else could the learning brain retain its plasticity long enough—"

"Exactly! But your enzymologists, as the least of their intrusions, have retarded that primitive latency plateau by twenty years. Neither of us is truly human, child, if you insist on your mythic definitions."

"We have expanded our humanity, Sandstrom," she says heatedly. "You have discarded yours for a compulsive, voracious noetics."

The dispute is trapped in its conflicting categories. Sandstrom leaves her at last, and she cleaves to her certitudes. By now, no doubt, the Four of her Five are dispersed across the world, separated, lonely, adrift in the appalling seductions of various Nests. Worse still (the thought pierces her), perhaps they remain together, living and growing despite the suspended threat of severance; she is hardly ever in their thoughts; she is abandoned.

She will not seek out communion with the Darkstar. She will not. She yearns for sleep, but it has been taken from her.



Hansen—cont. from page 27

afraid the machine would find him through you. Don't you see, I had a secret too, a terrible secret I kept from you. I was working for the Mindmech." She laughed, a long despairing laugh. A hopeless sad lamentation. "And it wasn't necessary. Not necessary at all. I could never have betrayed you, not you, not after knowing and loving you. I would have gladly died first."

The sky was light with dawn now. Soon the sun would rise.

She unfolded her wings and beat them once, testing their strength. "It is time," she said. "The change is done. I must go now."

"Wait." I wanted her to stay, but I knew she couldn't. I didn't want to lose her, even though she had been a pawn of the Mindmech.

"I can't. I mustn't. The call is strong, too strong to resist anymore. I loved you, but that is gone now. The memory will last, the memory of the love between us will stay forever with me."

She leaped into the air from the balcony and glided silently away. The long wings beat slowly and she climbed high. She went to join the other whisper-birds in the mountains, to join them in their hunt. I watched for as long as I could see the great wings silhouetted in the sky of dawn and then I left the balcony and pulled shut its doors.

I built a fire in the cold fireplace, piling the knotty logs high, so they would burn through the morning. Soon the Mindmech too would be gone and men would no longer need machines. The samsa would have known their destiny at last.

I would no longer need the Doctor then. I had plans for him. I wondered what he would feel when I told him of the hidden circuit in the bypass modules. The special circuit that would overload and short the machine's brain when activated by a certain signal. I daydreamed about when I could tell him I had sent the signal and left a thousand of his children demented, mindless hulks. I would watch his face carefully, hoping to see his feelings inside. It was a shame machines felt no anguish.

I lay in front of the fire, in front of the flames without warmth. The fear was gone. I thought I might sleep for a while. While I slept the fire would continue to burn and the soft ash would slowly filter down from the grate.



ASTER WOKE, which surprised her. Unless she was in Hell, or some such variety of unpleasant Beyond, but she didn't believe in it. Besides, although she was in pain, it wasn't quite racking enough. It fogged her thoughts and held her motionless for fear of increasing it, but she did not actually feel any need to scream. Perhaps she was alive after all, unlikely as it seemed. She opened her eyes.

Nothing. Blackness, marked only by the aurora of colors her eyes put there, in protest. If she was still wearing her oxygen mask, she could not feel it.

Well, perhaps she wasn't alive, then. But she was lying on something soft, with odd lumps in it, poking her at odd angles. Aster tried to reach out her hand to explore it, although she was not sure just where her hand was in that darkness.

Her hand moved, and she felt pain explode inside her. She did scream then, but she knew she was alive. The pain was not universal, but had a location: upper right arm and shoulder. Besides, she could feel that she was wearing clothes and her oxygen mask, as they pressed at her in different points in response to her motion.

The laser shot must have just barely touched her.

But Lyn had shot a Draco from halfway across the spaceport. It seemed odd that she would miss Aster from a couple meters distance. Nevertheless, it seemed that she had done so.

Where the hell was Lyn, anyhow? Aster tried moving a hand again—the left, this time—and found herself touching smooth cloth, something as highgrade as dracosilk or the like. She moved her hand up along the cloth and encountered the soft bulge of a breast and above it the hard one of a tube to feed an oxygen mask. That, presumably, was Lyn. Aster was lying on top of the woman she had hunted. They were buried together like lovers. Aster felt a sudden resentment of the forced intimacy, and an irrational guilt at using a person for a pillow, however unintentionally.

Slowly, easing her legs carefully off the body, she managed to raise herself into a kneeling position, with her legs on the ground beside Lyn. The ground felt odd—gritty, and rocky beneath the grit. She tried to figure out what had happened.

The Draco guards, in their methodical way, had set out to close the port exits and search all the establishments in the city able to supply oxygen. But Aster had had a hunch that a human gambler would have hedged bets for getting off a world with an unbreathable (to humans) atmosphere. She headed for the maze of luggage racks, hoping to find luggage that was not simply what it should be, and Lyn with it. She'd found the suspicious luggage—a suitcase quietly assembling itself into a private Porter, but the ragged heaps of baggage betrayed her. Before she could either safely retreat or figure out which pyramid Lyn had slipped behind, the gambler leaned out from a free-form Mudlet version of a trunk and slapped the laser out of Aster's hand, then ordered her to turn around and lean against the most stable-looking of the heaps.

At that point, Aster's memory quit on her, and she could not get it to move. It balked. She could almost feel cogs in her head refusing to shift. Finally, one of them did shift—into headache gear. She abandoned the effort, closed her eyes, and set herself to holding still while her head calmed down. What had happened was clear enough anyway. She supposed she had tried to jump Lyn instead of submitting

Ruth Berman

Draconian Inheritance

The Draco guards, in their methodical way, had set out to close the port exits and search all the establishments in the city able to supply oxygen. But Aster had had a hunch that a human gambler would have hedged bets for getting off a world with an unbreathable (to humans) atmosphere.



quietly to what she expected would be a shot in the back. Which did not explain why all the luggage area lights were out, nor how a polished stone floor became uneven and dusty.

"Hello!" she shouted. Her voice was distorted, coming through the mask. There was no answer, not even an echo. She shouted again, but the only response she got was a moan from Lyn. She opened her eyes to look at her again and was relieved and then startled to find that she could see her, faintly. There was a dim, grey light off to one side of the floor....

The horizon.

They must have gone through the damn Porter in struggling.

A bright full moon or a pale sun started to rise. It shone white through a clear sky which was green at the horizon and shaded into purple overhead. The colors grew in intensity as she watched. Aster thought the planet was actually turning faster than, say, Earth did, but she did not quite trust her senses with the pain-fog between them and her.

She tried to bend her head to look at her shoulder, but it hurt too much. "Probably cooked," she thought, and the idea made her hungry, and then sick at the cannibalistic implications of the notion. She swallowed against the nausea, struggling for control.

Then Lyn groaned. Her eyes opened, showing green instead of grey, because of the sky reflected in them. She shut her eyes again under the pressure of the light, then opened them a crack. "That you, pig?"

Aster was too tired to contest the manner of address. "Afraid so. What happened?"

Lyn opened her eyes wide for a moment, and shut them only halfway. "Funny, I was going to ask you that."

"You got the drop on me, and after that I can't remember. I think I tried to jump you, but—"

"You must have," Lyn agreed. "And my bootleg Porter had just about finished setting up when you came along at the first place. . . did we make it to Plumwing?"

"I doubt it. I've never been there, but I've seen travel brochures. Most of it is inhabited, isn't it?"

"And the sky's the wrong color."

"Umm," said Aster. "But sunrise is a bad time to try to judge that." She looked doubtfully at the pale sky. "Or moonrise, either, I guess." She edged her mask away from her nose and mouth and took a hesitant breath. She caught a whiff of human sweat, and took a deeper breath, in the relief of not smelling her burned shoulder. It would probably be all right, assuming she got proper treatment.

The air was flat, without any odor she could detect. It did not seem to be poisonous, but after a few moments she could feel herself getting dizzy and sleepy. She pushed the mask back into place. "No oxygen. Not Plumwing. Damn it, for a gambler you're not very dexterous."

"Well, I'm only an average to good player."

"Obviously, or you wouldn't have been caught cheating."

The mask hid her mouth, but a smile showed suddenly in Lyn's eyes and along the cheeks. "Yes. Well, it's wrong and probably sinful, but not greatly so by my reckoning, or even yours, pig, I should think. I don't know anyone but Dracos who make cheating at games a hanging offense."

"Strangling," said Aster.

"Correction noted. Damn all these local legal codes, any-

how. So you're a good, efficient guard, who goes after any offplanet felon, even another human?"

"Especially humans. That's why they hired me. It's a job." Her arm hurt. "And you did kill a Draco."

"Self defense." Lyn cautiously rolled over and sat up, then quietly looked around, rubbing one hand against her forehead. "I wonder where the hell we are. I suppose we're lucky the Porter intercepted a planet at all."

"Dunno." Aster reached down, found her radio still on her belt, and switched it to an automatic distress call. It was hard to set it left-handed.

"You think that walkie-talkie's going to do anything?"

Aster stopped herself from shrugging just in time. "Might. If there's anyone around inside a couple light-years. It'd take them a while to get a fix on us, but you can put me under, and we'll trance to save oxygen."

"I can—well, yes, I can. What kind of a dossier have I piled up, anyway? I'm not illegal on that many planets."

"No. But you were arrested once on the Mattermatter Colony—"

"—for breaking the local anti-Yoga laws. Right. You know, I don't see how out-of-culture pigs like you can do it. You don't believe in that nonsense."

"No, but most laws aren't that silly. And pigs don't get the option of deciding which sections they'll enforce. Besides, what can anyone do about it? Join the League to Promote an Interbeing Code of Justice? Nice set of ideals, but it's been going no place for. . . how many standard years?"

Lyn looked at her considerably. "You can't trance yourself, I take it."

"No, it comes hard for me."

"I've noticed that about pigs. What is it, no imagination, or the occupation kills it?"

Aster forgot not to shrug and caught her breath with a gasp.

"Sorry. All right, I can put you under, I suppose. But somewhere along the way I've hit my head—on this petrified bedspread we're on, I think, unless it was going through the Porter—and I won't be able to get myself under. Concussion, my dear pig, is not good for the meditative faculties. Make a note."

"Oh. Well. . . you'd better take most of my oxygen."

"Right, I will. Now look in my eyes."

Aster hesitated. It would be easy for Lyn to take all the oxygen—not so easy to avoid a murder rap if she did. But she was already under sentence of death on Draco anyway. Still—she'd managed to miss killing with a shot from two meters away, and, anyhow, under the circumstances Aster couldn't see any way out of trusting her.

Lyn's eyes were green after all, but only in a central wheel of the iris. The ring nearest the iris was brown, and the outermost ring was a narrow band of grey-blue. The whole iris was flecked with minuscule gold wedges, but all the colors were fading as the increasing brightness turned the green sky grey and greyed the colors of Lyn's eyes. It was probably a sun rising after all, not a moon, but she could not look away to see it. Lyn's eyes became two seas, then one, and Aster felt herself drowning.

SO SHE WAS NOT, at first, surprised to find herself underwater when she woke. She was huddled inside a sort of diving bell, and outside it a large blue jelly-fish speckled with silver hung in the water, looking in at her. Beyond it, a wall surfaced with multi-hued porcelain shimmered through the drifting currents.

The creature blurbled something, sounding like a brook over stones. A translator repeated, "How do you feel?"

"Not too bad, I guess. My shoulder hurts." But it hurt much less than before. Her neck felt too stiff for her to try to see how it looked, but a tightness and a numbness around the ache suggested, respectively, bandages and an anesthetic. Aster thought of asking where they were, but it didn't really matter who had picked up the distress-signal. Instead she asked, "How much would it cost for us to port to Draco from here?"

"Irrelevant, I regret. You have messages." The water-being reached out to touch a porcelain lever. She heard the voice of the head guard at the Draco Spaceport calmly informing her that, as they were informed that she was damaged extensively enough to need regeneration, they were terminating her employment with them, and would be happy to recommend her to any future prospective employer when she regained her health; her contract, of course, included insurance, and the Spaceport would pay her medical costs. Such a particularly calm tone of voice indicated the Draco's sorrow at losing her, but Aster could not help saying, "Those bastards!"

The translator obligingly repeated this remark to the waterbeing. It shivered, in what she hoped was amusement but feared was shock. Besides, obscenity was illegal on some planets. She added hastily, mimicking its phrasing on the assumption that it had treated her with courtesy, "I regret." She was surprised, however, to realize that she did not feel regretful at all over losing her job. The insurance would take care of her for a while, and after that she had enough saved to live on for a few years. In the meantime she could be on the lookout for another job. It was annoying that the Draco Seaport authorities were not willing to hold her job open for her, but she could use a vacation. All she would have to do would be to see to it that Lyn was brought in. Which would be a pity. Perhaps, she thought maliciously, she could interpret her job's end to include doing nothing about Lyn. . . or had the Dracos already paid to have her ported back to them for trial? But surely they would have had the courtesy to have had Aster sent along at the same time, so that she could collect her few belongings? "Where is the human who was with me?" she demanded, then added, "Please."

"Irrelevant, I regret," the waterbeing repeated, and started another message. This one was from Lyn.

"I've just about used up all the oxygen, and so far there's no sign we're going to be found, I bequeathe my bank account, such as it is, to my brother Roland." She reeled off his identification number with a gambler's glib memory for figures. "If he can find anything else I own, he's welcome to do what he likes with it, except that if the pig who's with me happens to be alive when you find this—if anyone finds it—I want her to be given the rest of my ten-standard-year membership in the Interbeing Justice League. I don't know her name, but as we're the only beings on this rock, it shouldn't be hard to pick her out. The League has

"Sorry. All right, I can put you under, I suppose. But somewhere along the way I've hit my head—and I won't be able to get myself under. Concussion, my dear pig, is not good for the meditative faculties. Make a note."

been a useless sort of organization, I grant you, but she seems to be an efficient sort. Maybe she'll change it a bit. She won't want to, but she owes me." She gave her name and identification number, and the tape ended.

Aster gaped. The motion hurt, and she brought her jaw up carefully. "Lyn is dead?"

"Lyn is dead," the waterbeing agreed. "I regret."

"Will you stop re—" Aster cut the sentence short. "Thank you," she said after a moment. "Can you tell me how much it would cost to port to Earth or any planet with a hospital specializing in humans?"

"I will discover and inform." The waterbeing rippled away, glinting silver as it went.

Aster tried to relax inside the cramped quarters of her little bell. Her first objective, clearly, was to get her health back. And after that, it certainly might be amusing to spend some time working for the League, even if it was impractical. She could work for it fulltime as a volunteer while her savings held out, and possibly it could manage to find her a paying job later. Lyn was wrong: It was work she probably would want to do.

Aster wondered if she would have been able to find a way of getting out of the charges laid against her on Draco. It hurt not to know. Or, no, she decided, it hurt not to be able to try. She wanted to set aside this useless line of thought, but she did not have the command-of-mind to do so. Instead, she wept for a long time, softly, so as not to hurt her shoulder. The tears felt good.



We are now in the early stages of a battle for the mind—or at least the eyes and ears— of the human race, a battle which will be fought 36,000 kilometers above the equator.

Clarke—cont. from page 21

ing in an elongated orbit that took them high over Russia for a few hours of every day. However, they have now seen the overwhelming advantages of stationary orbits, and several of their comsats are currently fixed above the Indian Ocean. Some are designed for TV relaying to remote parts of the Soviet Union, and I've gently hinted to my friends in Moscow that perhaps they could fill the breach when ATS-6 goes home...

We are now in the early stages of a battle for the mind—or at least the eyes and ears—of the human race, a battle which will be fought 36,000 kilometers above the equator. The preliminary skirmishes have already taken place at the United Nations, where there have been determined attempts by some countries to limit the use of satellites which can beam programs from space directly into the home, thus bypassing the national networks. Guess who is scared...

As a matter of fact, I tried to frighten the United States with satellites myself, back in 1960, when I published a story in *Playboy*¹¹ about a Chinese plot to brainwash innocent Americans with pornographic TV programs. Perhaps 'frighten' is not the correct verb,

and in these permissive days such an idea sounds positively old-fashioned. But in 1960 the first regular comsat service was still five years in the future, and this seemed a good gambit for attracting attention to its possibilities.

Fortunately, in this area there is an excellent record of international cooperation. Even countries who hate each other's guts work together through the International Telecommunications Union, which sets limits to powers and assigns frequencies. Eventually, some kind of consensus will emerge, which will avoid the worst abuses.

A major step towards this was taken on August 20, 1971, when the agreement setting up INTELSAT (the International Telecommunications Satellite Organization) was signed at the State Department. I would like to quote from the address I have on that occasion:

I submit that the eventual impact of the communications satellite upon the whole human race will be at least as great as that of the telephone upon the so-called developed societies.

In fact, as far as real communications are concerned, there are as yet no developed societies; we are all still in the semaphore and smoke-signal stage. And we are now about to witness an interesting situation in which many countries, particularly in Asia and Africa, are going to leapfrog a whole era of communications technology and go straight into the space age. They will never know the vast networks of cables and microwave links that this country has built at such enormous cost both in money and in natural resources. The satellites can do far more and at far less expense to the environment...

...I believe that the communications satellites can unite mankind. Let me remind you, that, whatever the history books say, this great country was created a little more than a hundred years ago by two inventions. Without them, the United States was impossible; with them, it was inevitable. Those inventions were, of course, the railroad and the electric telegraph.

Today we are seeing on a global scale an almost exact parallel to that situation. What the railroads and the telegraph did here a century ago, the jets and the communications satellites are doing now to all the world...

And the final result—whatever name we actually give to it—will be the United States of Earth.

I WOULD LIKE TO END with some thoughts on the wider future of communications—communications beyond the earth. And here we face an extraordinary paradox, which in the centuries to come may have profound political and cultural implications.

For the whole of human history, up to that moment one hundred years ago today, it was impossible for two persons more than a few meters apart to interact in real time. The abolition of that apparently fundamental barrier was one of technology's supreme triumphs; today we take it for granted that men can converse with each other, and even see each other, wherever they may be. Generations will live and die, always with this godlike power at their fingertips.

Yet this superb achievement will be ephemeral; before the next hundred years have passed, our hard-won victory over space will have been lost, never to be regained.

On the Apollo voyages, for the first time, men traveled more than a light-second away from Earth. The resulting 2½-second round-trip delay was surprisingly unobtrusive, but only because of the dramatic nature of the messages—and the discipline of the speakers. I doubt if the average person will have the self-control to talk comfortably with anyone on the Moon.

And beyond the Moon, of course, it will be impossible. We will never be able to converse with friends on Mars, even though we can easily exchange any amount of information with them. It will take at least three minutes to get there, and another three minutes to receive a reply.¹²

Anyone who considers that this is never likely to be of much practical importance is taking a very short-sighted view: It has now been demonstrated, beyond reasonable doubt, that in the course of the next century, we could occupy the entire Solar System. The resources in energy and material are there; the unknowns are the motivation—and our probability of survival, which may indeed depend upon the rate with which we get our eggs out of this one fragile planetary basket.

We would not be here, talking about the future, unless we were optimists. And in that case we must assume that eventually very large populations will be living far from Earth—light-minutes

and light-hours away, even if we only colonize the inner Solar System. However, Freeman Dyson has argued with great eloquence¹³ that planets aren't important, and the real action will be in the cloud of comets out beyond Pluto, a light day or more from earth.

And looking further afield, it is now widely realized that there are no fundamental scientific obstacles even to interstellar travel.¹⁴ Though Dr. Purcell once rashly remarked that star-ships should stay on the cereal boxes, where they belonged—that's exactly where moonships were, only thirty years ago...

So the finite velocity of light will, inevitably, divide the human race once more into scattered communities, sundered by barriers of space and time. We will be as one with our remote ancestors, who lived in a world of immense and often insuperable distances, for we are moving out into a universe vaster than all their dreams.

But it is, surely, not an empty universe. No discussion of communications and the future would be complete without reference to the most exciting possibility of all—communications with extra-terrestrial intelligence. The Galaxy must be an absolute Babel of conversation, and it is surely only a matter of time before we can hear the neighbors. They already know about us, for our sphere of detectable radio signals is now scores of light-years across. Perhaps even more to the point—and more likely to bring the precinct cops hurrying here as fast as their paddy-wagon can travel—is the fact that several microsecond-thick shells of x-ray pulses are already more than ten light years out from earth, announcing to the universe that, somewhere, juvenile delinquents are detonating atom bombs.

Plausible arguments suggest that our best bet for interstellar eavesdropping would be in the thousand Megahertz, or thirty centimeter, region. The NASA/Stanford/Ames Project Cyclops report, which proposed an array of several hundred large radio telescopes for such a search, recommended a specific band about 200 Megahertz wide—that lying between the hydrogen line (1420 MHz) and the lowest OH line (1662 MHz). Dr. Bernard Oliver, who directed the Cyclops study, has waxed poetic about the appropriateness of our type of life seeking its kind in the band lying between the disassociation products of water—the 'water-hole'.¹⁵

Unfortunately, we may be about to

pollute the water-hole so badly that it will be useless to radio astronomers. The proposed MARESAT and NAVSTAR satellites will be dunked right in the middle of it, radiating so powerfully that they would completely saturate any Cyclops-type array. Barney Oliver tells me: "Since the Cyclops study, additional reasons have become apparent for expecting the water-hole to be our contact with the mainstream of life in the Galaxy. The thought that we, through our ignorance, may blind ourselves to such contact and condemn the human race to isolation appalls us."

I hope that the next World Administrative Radio Conference, when it meets in 1979, will take a stand on this matter. The conflict of interest between the radio astronomers and the communications engineers will get more and more insoluble, until, as I suggested many years ago,¹⁶ we move the astronomers to the quietest place in the Solar System—the center of the lunar Farside, where they will be shielded from the radio racket of earth by thirty five hundred kilometers of solid rock. But that answer will hardly be available before the next century.

Whatever the difficulties and problems, the search for extra-terrestrial signals will continue. Some scientists fear that it will not succeed; others fear that it will. It may already have succeeded, but we don't yet know it. Even if the pulsars are neutron stars—so what? They may still be artificial beacons, all broadcasting essentially the same message: "Last stop for gas this side of Andromeda."

More seriously, if the decades and the centuries pass, with no indication that there is intelligent life elsewhere in the universe, the long-term effects on human philosophy will be profound—and may be disastrous. Better to have neighbors we don't like, than to be utterly alone. For that cosmic loneliness could point to a very depressing conclusion—that intelligence marks an evolutionary dead-end. When we consider how well—and how long—the sharks and the cockroaches have managed without it, and how badly we are managing *with* it, one cannot help wondering if intelligence is an aberration like the armour of the dinosaurs, dooming its possessors to extinction.

No, I don't really believe this. Even if the computers we carry on our shoulders are evolutionary accidents, they can now generate their own pro-

grammes—and set their own goals.

For we can now say, in the widest possible meaning of the phrase, that the purpose of human life is information processing. I have already mentioned the strange fact that men can survive longer without water than without information...

And therefore the real value of all the devices we have been discussing is that they have the potential for immensely enriching and enlarging life, by giving us more information to process—to the maximum number of bits per second that the human brain can absorb.

I am happy, therefore, to have solved one of the great problems the philosophers and theologians have been haggling over for several thousand years. You may, perhaps, feel that this is rather a dusty answer, and that not even the most inspired preacher could ever find a religion upon the slogan: "The purpose of life is information processing." Indeed, you may even retort: "Well, what is the purpose of information processing?"

I'm glad you asked me that...

1. Glide Path (Harcourt, Brace, Jovanovich, 1963). See also "You're on the glide path—I think" (The Aeroplane, 1949 September 23. Reprinted in IEEE Transactions on Aerospace and Navigational Electronics, Vol. ANE-10, No. 2, 1963 June). There is an echo of GCA in my 1945 communications satellite paper. The S-band Search radar had a cosecant-squared polar diagram to increase field strength at slant range. I realized that comets would face a similar problem and therefore suggested the use of a 'non-uniform radiator'. As the war was still on, and my MS had to be checked by RAF Security, this was sailing as close to the wind as I dared.

2. New York Times, Music Section, 1975 May 11.

3. I am much indebted to Mr. Anthony Wedgwood-Benn for this quotation, which he discovered when he was H. M. Postmaster General. However, to do proper justice to Sir William Preece, it should also be pointed out that he was largely responsible for setting up the British telephone system—and was also, a quarter of a century later, a pioneer of "Wireless" and one of Marconi's chief supporters!

4. Imperial Earth (Harcourt, Brace, Jovanovich, 1975)'

5. No joke, this. My friends at TIME-LIFE once told me that when they edited Churchill's war memoirs, they found countless statistical errors. The trouble was traced to the great man's habit of dentureless dictation.

6. By Dr. Solomon Golomb.

7. The Maturate Society.

8. Aerospace Corporation Report, Potential Space System Contributions in the Next Clarke—cont. on page 14

Under these circumstances robots can be seen only as a threat. Only in an under-populated, virgin world can robots come into their own, freeing humans for more intellectual pursuits.

Weston—cont. from page 11

of the story, with hindsight, do we realise that the real hero of the book is the computer. While other authors show a super-brain as some sort of device that talks like Jehovah, only louder, Heinlein has been more subtle and leaves his human protagonists convinced things worked out in the way they intended—without ever realising how they have been manipulated to achieve the computer's own ends.

YOU MIGHT LIKE to contrast this with Harlan Ellison's Hugo-winning and single best story to date, "I Have No Mouth And I Must Scream" which deals quite simply with a computer that *does* talk like Jehovah; and deals measured doses of hell to those few unfortunates in its power.

That's the trouble with a machine; it won't change its mind and it doesn't make mistakes. As the protagonists found out in Jack Williamson's classic novel, *The Humanoids*.

Williamson is sparse on the actual technical details but this time it doesn't matter. His robots—the humanoid of the title—are orthodox metal bipeds, al-

though in this case they are all controlled by one massive centrally-located "brain". The interesting thing about the story is its philosophical content: created to protect humanity the humanoids end by putting mankind into a stultifying prison in which research or creative endeavour is forbidden and unhappiness and discontent are banished by drugs and/or brain surgery.

Their motto is "To Serve And Obey And Guard Men From Harm", and they are simply too successful in its observance. The message is that mankind needs freedom in order to be truly alive.

Fritz Leiber's *The Silver Eggheads* has a much lighter tone. Wild, almost farcical at times it portrays a future world in which robots have not only been successfully developed but, as intelligent beings, have won their own battle for emancipation and lead their own lives in parallel with those of human beings. Of course they do have special problems, as are explained by Zane Gort, a self-employed robot writer:

"It's no joke being a free business machine, you're launched into life with a crushing debt load (since you're approximately as expensive as a space cruiser or research satellite) and you knock yourself out just keeping up the interest payments. Often you dream of how much simpler it would be and how much more secure you'd feel if you were just a slave, owned and cared for by someone else, a light-hearted machine without responsibilities."

Leiber's romp is great fun and shows just what can be done by a writer of authority, satirizing and commenting upon SF's own conceptions of robots through the years. For instance, Zane Gort's profession is to write stories for other robots, because the early Asimovian yarns in his collection, *I Robot*, had proved to have such a therapeutic effect in cheering-up depressed and misunderstood metal folk. And Leiber takes up the idea of robotic sex where Van Vogt left off, plausibly and hilariously explaining the role of *brunch* (male) and *icy* (female) and the way in which they plug-in to each other's sockets.

I think there is a difference here between Leiber's concept of interrobotic sex and some earlier stories such as Lester Del Rey's "Helen O'Loy" (1938) where the robot becomes virtually indistinguishable from a human female.

In this case 'Helen' is a housekeeping robot designed into a girl-modelled case, complete with tear glands and taste buds, ready to simulate every human action from breathing to pulling hair. The previous line is a direct quote and I idly wonder whether Del Rey really means that "every" human action; but this was 1938, after all, and some things could not be spelled out in the magazines of the time!

Anyway, Helen looks and acts like a woman, and her mechanical brain is so humanlike that she comes to think of herself as a woman. The resulting love-story is something of a milestone in science fiction.

However this opens an interesting line of speculation; why *try* to make robots look and behave in such a life-like manner? Isn't the whole point of the exercise to create a machine ready and willing to do all the menial and dirty jobs that real people don't want to do?

The only justification I can see is for cosmetic reasons; human-like exteriors to soften the impact of otherwise ugly metal contraptions. Although personally I wonder how successful this might be. Do you remember how Asimov shows us two examples in *The Caves of Steel*? First, R. Sammy, a crude and clumsy Earth-manufactured robot with a skin of hard and glossy plastic, nearly dead-white in colour with expression fixed at an unreal level of inane good humour.

Then there is R. Daneel Olivaw, made on the outworlds and so skillfully camouflaged that he passes the closest scrutiny. Yet it's hard to decide which alternative creates the most hostility in our hero Lije Baley. At least with R. Sammy you know what you're dealing with, he complains.

The other side to this particular coin is put succinctly by Zane Gort:

"Most robots simply didn't want to look like human beings—they wanted to be sleek hard metal and nothing else; a soft bulbous robot or robik who looked like a human being, even a beautiful one, would have been ostracized by them and forever barred from their particular delights, especially all robot-robik acts of tenderness."

Unless of course our robots are not made from metal cams and gears at all, but are in some way grown organically. With modern advances in biology it's not inconceivable that a complete arti-

ficial creature might be made in something very close to flesh-and-blood, in which case there's no reason why it shouldn't bear the closest resemblance to man himself.

In science fiction the correct term here is 'android', and the possibility of their existence poses any number of legal and ethical questions. What is "alive"? What is "human"? How could such a being be kept in a state of chattel slavery?

Many times SF authors have wrestled with these problems. Poul Anderson's Jovian inhabitants in "Call Me Joe" are androids, though not made precisely in our image. Cordwainer Smith's underpeople are animal-derived but in a way androids, subject to harsh laws and consigned to the scrap heap at the first symptoms of debility. Two other similar situations are portrayed in Heinlein's "Jerry Was A Man" and Walter M. Miller's "Conditionally Human".

The best treatment of all is in quite a short story, in William Tenn's classic "Down Among The Dead Men". It is one of the few times that science fiction gives us a view of the position from the android's viewpoint: "When you talk about us, Commander, or when you think about us, do you call us zombies? Or do you call us blobs? That's what I'd like to know, Commander. That's what I'm curious about."

Tenn captures the bitterness that the androids feel, created equal in intelligence and ability but condemned to permanent life as second-class citizens, an inferiority worse than that suffered by any unaffected racial group today. This is the nub of my objections to the whole idea of androids; we have so many under-privileged already, do we really need more?

Yet in this short story Tenn very cleverly answers that objection. The Earth is fighting a relentless war for survival against an alien invasion which it can only win by mobilizing all available manpower. The androids have been conceived as an act of desperation to top up the armed forces when otherwise they would have reached the bottom of the manpower barrel. And it's a good point; it takes 20 years to make a real soldier and only 20 days for an android!

Asimov briefly tackles the same objection in *The Caves Of Steel* and its sequel *The Naked Sun*. These are his

best two novels, and in them he advances his whole conception of robots by several quantum jumps. The collected robot stories I've already labelled as logical exercises but here he speculates seriously upon the ways in which robots might revolutionize society.

He answers my complaint that the last thing we want is another minority group here on Earth by agreeing that there is no place for robots, here on Earth. Why displace the several billion people who are doing low-grade, menial jobs unless they can be provided with something better? One of the world's major problems is already to find employment for the masses in the poor nations around the globe.

Under these circumstances robots can be seen only as a threat. Only in an underpopulated, virgin world can robots come into their own, freeing humans for more intellectual pursuits (as in *Solaria*, in *The Naked Sun*).

Asimov has advanced his C/Fc culture as a serious answer to the world's problems, providing that the population can be increased in quality and not quantity. To that I might add also that provided robots will cost less than "a space cruiser or research satellite" and provided they can be made to possess the versatility of a human being without gaining a troublesome self-awareness of their own.

That's a good word; awareness. Just how can a machine become alive, you might ask? There is one answer which I've never seen elsewhere, and that is in Poul Anderson's ultimate robot story, "Epilogue".

This time Anderson takes us several billion years into the future and shows us an Earth on which all organic life has died out—but has been replaced by a metallic, robotic variety of 'life' which has genuinely evolved from primitive beginnings in much the same way as we have evolved from an amoeba-like ancestor. Just how Anderson justifies his argument I'll leave for you to find out, but it is real 'sense-of-wonder' stuff!

CLEARLY this whole subject is far from simple, and it seems to lead into all sorts of unexpected paths and byways. One further avenue of exploration is the converse of the situation in which machines grow more and more like men. What if men begin to resemble machines?

For some reason this difficult theme has attracted some of the major SF talents. "No Woman Born" (1944) by C. L. Moore is a truly outstanding story which reads as well today as when first published. It describes Deirdre, a beautiful woman, an opera singer who is tragically burnt to death—or near-death—in a devastating fire. Her body is destroyed but her brain is saved and she is given an entirely new body constructed from metal so that to all outward purposes she has become a robot.

The theme is handled with skill and compassion. How can Deirdre lead a normal life, now? Is she still human? In the very last line she discusses her future, "with the distant taint of metal already in her voice".

Twenty years later Damon Knight deals with exactly the same situation, in his story "Masks". Here a man has been put into an artificial body and starts to ask himself the same questions. Does the world of man have a place for him? What can he do now that all previous meaning to his life has been removed? Unlike Deirdre he finds an answer.

While in Algis Budrys' novel *Who*, we find an odd half-case, a man whose terrible injuries have been repaired with metal components so that he has become half-human, half-machine. He is an embarrassment and a source of fear to all around him and though he doesn't want to leave humanity behind, in the end he has no choice; he is forced away. You won't find any of this sort of conflict in "The Six-Million Dollar Man".

That really concludes this very fast tour of an immense area of territory sheltering under the general umbrella of the 'robots' label in science fiction. Many, many more stories exist which perhaps should deserve a mention; Henry Kuttner's collection, *Robots Have No Tails*, which is a purely comic treatment, and Harry Harrison's book, *War With The Robots*, which has something in common both with Kuttner and Fritz Leiber's *Silver Eggheads*.

Intelligent computers abound in science fiction; two more examples are David Gerrold's *When Hatlie Was One*, and Arthur C. Clarke's "Hal" in *2001; A Space Odyssey*.

What conclusions can be drawn? That robots have been one of the most badly-handled of all SF gadgets? That Weston—cont. on page 79

Andrew Whyte

The Aleph:

A Seasonal Microcosm

What follows is a comprehensive listing of NEW SF novels and single-author collections scheduled for publication from September thru December 1976. Not included due to lack of space are reprints and re-issues, books by authors outside the field, and fiction falling into the categories of: heroic "adult", occult/supernatural, contemporary fantasy, juvenile and young adult, and the Perry Rhodan series, general anthologies and special editions, all of which would have been relevant. We hope for more space in the future (so to speak. . .)

The idea behind this listing is to help the reader make a personal judgment about the books he would like to purchase over the next few months and provide a general survey of SF publishing during that time period. Most SF readers know the kind of story they like. Newcomers may be baffled by an overabundance of titles. I hope to provide a service that will be useful to everyone and that will not duplicate the excellent coverage provided by other publications in the field. Information has been furnished either directly by the publishers or has been taken from catalogues, as well as advance reviews in other professional journals. It should be borne in mind that publishing schedules are uncertain. The more distant a book's scheduled publication, the less likely that date and price will be correct. Many books may be delayed or even cancelled. At the time this list was prepared, however, the information presented was as accurate as the many publishers, editors, and publicity staffs could make it. Lack of descriptive material for any book only indicates the lack of specific information available at press time.

70 GALILEO



**ANDERSON, Poul
MIRKHEIM**

Berkley/Putnam; novel
January publication; Price not set

An important chapter in Anderson's Technic History sequence, this new novel recounts events in the later life of trader David Falkayn, whom we last saw in "Lodestar" at odds with his boss, the wily scoundrel Nicholas Van Rijn. The collapse of the Polesotechnic League is now inevitable; things fall apart. . . mere anarchy is loosed...

**ANTHONY, Piers/COULSON, Robert
BUT WHAT OF EARTH?**

Laser; novel
October; \$1.25

A scientific breakthrough makes flight to the stars a reality, offering some a chance to escape a dying earth. There is a mass exodus and those left behind must make out the best they can. This novel marks the first collaboration between the better known Anthony and Coulson, who has written several novels with Gene De Weese.

**AVERY, Richard
THE VENOM OF ARGUS**

Fawcett; novel

September; \$1.25

From the Expendable series, number four. The crew of the starship Santa Maria were all either criminals or outcasts. But who else would have braved the deadly perils of such worlds as Kratos, Tantalus, and Zelos, the survivors electing to continue their hazardous mission? This British action-adventure series is thought by many to be the work of a pseudonymous Edmund Cooper.

**BIGGLE, Lloyd
A GALAXY OF STRANGERS**

Doubleday; collection
October; \$5.95

There is one other book of Biggle's shorter works, *The Rule of the Door and Other Fanciful Regulations*, published by Doubleday in 1967.

**BRADBURY, Ray
LONG AFTER MIDNIGHT**

Knopf; collection
September; \$7.95

Twenty-two stories are featured in this author's first collection since *I Sing the Body Electric*, seven years ago. Some of them appear to be new and more SF oriented than those of recent

The Aleph

memory.

BRUNNER, John
INTERSTELLAR EMPIRE

Daw; collection
September; \$1.50

Brunner has steadily been revising his Ace Double-Novels and the new versions usually have new titles. Three of these early works are included in this book, all set on the planet Argus in the twilight of a galactic empire. Former titles, *The Altar On Asconel*, *The Space-Time Juggler*, and a third title unknown.

BUDRYS, Algis
MICHAELMAS

Magazine of Fantasy & Science Fiction
August-September; \$2.

Budrys, the author of the recently revived, and probably classic, *Rogue Moon*, has been seen more as a critic than a writer of fiction lately. His first novel in ten years is set in 1999.

Laurent T. Michaelmas, an influential and peripatetic TV newscaster, with the aid of a self-devised computer with a discrete personality, secretly manipulates events for the greater good. When an astronaut is (apparently) killed before a crucial international mission to Jupiter, subsequent events lead Michaelmas to suspect some kind of conspiracy. But just who (or what) is behind it all—and why?

BUSBY, F. M.
RISSA KERGUELEN

Berkley/Putnam; novel
September; \$9.95

THE LONG VIEW

Berkley/Putnam; novel
November; no price set

These two titles are really one long novel—too long in fact, such are the economics of the book business, to be published in a single volume. Berkley/Putnam has done the next best thing, however, and readers of the first part of this "sizzling interplanetary adventure" should have only two months to wait for the conclusion. Rissa Kerguelen, described as Science Fiction's greatest heroine, is a child of fate: from her society's most humble origins she is destined to rise to become its most redoubtable challenge. Through chance, she becomes a symbol of freedom, but it is her courage and strength of will that make her so great an enemy of tyranny. This sounds like a crowd pleaser. If Busby manages to bring it

Draw Whyte

off, he could well find himself among the genre's most popular newer writers. If not. . .

CHALKER, Jack L.
A JUNGLE OF STARS

Ballantine; novel
November; \$1.50

Jack Chalker is the founder-director of Mirage Press, one of the best regarded of the 'fan publishers'. The announcement of his sale to Ballantine came as a suprise to many. Not only is this his first SF novel, but it is apparently the first SF story he ever wrote. The publishers are excited about this "science-fiction/mystery-suspense novel set against a background of an enormous galactic war. . .involving all the planets and all the intelligent races therein." A Viet-Nam casualty, John Savage is brought back to life for the first time to find himself obliged to take sides in a cosmic struggle between good and evil. Approached by representatives of both sides, he has no little trouble determining which side is which. Should he ally himself with the shape-changing Bromgeve or with its sworn enemy The Hunter? Upon Savage's decision rests the fate of mankind.

CHERRYH, C.J.
BROTHERS OF EARTH

Daw; novel
October; \$1.50

C.J. Cherryh's career began auspiciously earlier this year with the publication of *Gate of Iwrel*. Her second novel tells of the adventures of a castaway spaceman who becomes a pivotal force in a planet-wide civil war.

COULSON, Robert (see ANTHONY)

COVER, Arthur Byron
THE SOUND OF WINTER

Pyramid; novel
November; \$1.25

In the far-future Wasteland, the seasons change in a matter of moments. Danger abounds from myriad mutant monsters. Our hero, Sinclair, undertakes a perilous trek with a deaf-mute child, Elizabeth. When they are both menaced by a 'smurgh' (which can drain a man of his life's knowledge in seconds), a miraculous transformation takes place in the girl which is to have unexpected consequences. Cover (say 'coe-ver') the author of *Autumn Angels* and *The Platypus of Doom and other Nihilists*, is a rising young author

known for his outrageous sense of humor and fondness for the improbable.

CROWLEY, John
BEASTS

Doubleday; novel
September; \$5.95

The second novel by the author of last year's well received *The Deep* is set in a future world no longer ruled by Man. Genetic experimentation has produced human-animal hybrids, such as 'fox-men' and nomadic 'leos' (half man, half lion). Assassination and conspiracy are rife as various factions and mutations vie for domination. As before, the author's plotting is complex, his style distinctive and curious.

DARNAY, Arsen
A HOSTAGE FOR HINTERLAND

Ballantine; novel
December; \$1.50

Darnay, whose first story was published in 1974, has up to now been a contributor only to *Galaxy* where this novel was serialized last year. He is a nominee for the John W. Campbell Memorial Award for the recognition of promising new talent. The world a thousand years hence is divided into two antagonistic societies that, against the desires of both, are mutually interdependent. The urban structures of Union are held aloft by a force-field system that must be cooled by helium, an element manufactured only by the tribes of Hinterland. When a delegation from the tribes comes for the purpose of negotiation to the capital city of Union, events are set in motion which threaten to upset the balance of power.

DICKSON, Gordon
The DRAGON and the GEORGE

Ballantine; novel
October; \$1.95

In this new novel, a revised expansion of an earlier tale, we have comic fantasy that would have been at home in the pages of John W. Campbell's *Unknown Worlds*. When Jim Eckert's fiancée is transported to a medieval world as the result of an irresponsible experiment by Riveroak College's resident mad scientist, the young teaching assistant seems cast in the role of knight errant, sent out to rescue a damsel in distress. Unfortunately, however, Jim finds himself inhabiting the scaly armour of a very large and very

fierce dragon.

EKLUND, Gordon
DANCE OF THE APOCALYPSE
Laser; novel
November; \$1.25

Two dissimilar men form a partnership in the aftermath of a global catastrophe that has destroyed civilization.

The GRAYSPACE BEAST
Doubleday; novel
September; \$5.95

A hasbeen spaceman is offered a chance at redemption if he will lead an unlikely expedition into the limbo of grayspace to hunt a mysterious and deadly creature.

ERNSTING, Walter
The DAY THE GODS DIED
Bantam; novel
December; \$1.50

Ernsting is better known to American readers as Clark Darlton, principal contributor to (and I believe, originator of) Perry Rhodan, the endless space opera series that appears weekly in Germany and monthly in the U.S. (from Ace). The adventures in this book, however, are cast in the mode of another publishing phenomenon, the prophet of the 'Ancient Astronauts', Erich von Daniken. Indeed, he is thinly disguised as a character in the proceedings which (surprise) have to do with a long-lost civilization in an inaccessible secret place high in the Andes... The novel has been translated by Wendayne Ackerman (Mrs. Forry) who supervises the English versions of Perry Rhodan.

FUNNELL, Augustine
REBELS OF MERKA
Laser; novel
November; \$1.25

A sequel to another Laser title published in August reintroducing Brandyjack, a swashbuckling romantic hero who is the bane of a dictatorship that uses technology only to oppress.

GLUT, Donald F.
SPAWN
Laser; novel
October; \$1.25

Don Glut has published a book on SF Film, contributed short fiction to Perry Rhodan, and written a little-remembered novel published by Manor Books called *Bugged!*

GOLDIN, Stephen
FINISH LINE
Laser; novel
October; \$1.25

This book is a sequel to *Scavenger Hunt*, published by Laser in April. The pastime of an elite 'spacester' becomes, for some, more than a game...

GOTLIEB, Phyllis
O MASTER CALIBAN!
Harper & Row; novel
September; \$8.95

Gotlieb is a talented Canadian poet with a small number of excellent SF stories to her credit as well as one novel, *Sunburst*. Her second full-length work concerns a struggle for domination between the human members of a genetic research team on a bleak, isolated planet and their more numerous rebellious mechanical servants, the very sophisticated ergs.

GOULART, Ron
QUEST OF THE GYPSY
Pyramid; novel
September; \$1.50

What was the game? And who was he playing against? The man known only as 'Gypsy' had strange powers but only because 'they' had given those powers to him. It was they who moved him through time like a chesspiece across the board. This enigmatic character was conceived by Bryon Preiss and introduced in the first volume of the *Weird Heroes* series. This is the full length adventure in the series. Goulart has a light touch and likes eccentric machines.

GREENFIELD, Irving A.
THE FACE OF HIM
Manor; novel
September; \$1.50

One man comes to suspect that all is not right in the totalitarian world-state of which he is a citizen. What begins as doubt, becomes a profound questioning of belief, then outright rebellion. Somehow, in the process, he becomes a god.

HALDEMAN, Joe
MINDBRIDGE
St. Martin's; novel
September; \$7.95

S.F. Book Club; December
Joe Haldeman won the Nebula this year for his first novel, *The Forever War*, and by the time you read this,

it may have won him the Hugo as well. His second full length work, then, has to live up to high expectations. This is the story of Jacques LaFavre, an explorer in the vanguard of mankind's newly begun interstellar development program, the first (with his partner, who dies as a result) to discover a species of creature that can act as a 'psychic link'—a telepathic 'bridge.' This (and Jacques) becomes of paramount importance when an intelligent alien race is encountered, with its own plans for expansion, and little regard for the welfare of man.

HARDING, Lee
FUTURE SANCTUARY
Laser; novel
September; \$1.25

The first novel to be published in this country by an Australian writer whose first story appeared in 1961. This tells of a hunted man who finds sanctuary only to lose his memory. His search to recover his past leads to a surprising conclusion.

HOSKINS, Robert
MASTER OF THE STARS
Laser; novel
December; \$1.25

Intergalactic adventure and intrigue. ...Struggle against injustice and repression....Hoskins was at one time SF editor for Lancer Books.

KAPP, Colin
THE SURVIVAL GAME
Ballantine; novel
September; \$1.50

Two powerful alien kings, friendly rivals, take action to resolve a dispute regarding the qualifications of mankind for admission into their galactic trading empire. They capture a terran, the resourceful, Colonel Bogaert (known as Bogy) and set him down on a wild, primitive planet to see of what stuff men are made. The outcome of this game of survival is complicated by the advent of Miram, a beautiful Empress in flight from the pretender to her throne.

KORNBLUTH, C.M.
THE BEST OF C.M. KORNBLUTH
SF Book Club; October
Ballantine; January; \$1.95

The precocious Cyril Kornbluth died in 1958 at the age of 35 with many fine stories to his credit, as this retrospective collection bears witness, yet

THE ALEPH

how much more he would surely have given us if he had lived! The selections are chosen by his friend and collaborator, Frederik Pohl, who provides the introduction.

LAKE, David J.
WALKERS ON THE SKY
Daw; novel
December; \$1.25

Lake is a professor of English with another book soon to be published by Daw.

LAMPTON, Christopher
CROSS OF EMPIRE
Laser; novel
September; \$1.25

Lampton's first novel, *The Seeker*, a collaboration with David Bischoff, was published by Laser in May. His first story, also with Bischoff, appeared last year in the new Australian SF magazine *Void*, but he is an American.

RANDALL, Marta
ISLANDS
Pyramid; novel
September; \$1.25

Marta Randall's first novel, *A City In The North*, was published earlier in 1976 by Warner. Her first professional

SF sale was in 1975 to *New Dimensions*. This story of a future society where everyone is immortal, is about one woman for whom the drugs did not work.

MALZBERG, Barry N.
DOWN HERE IN THE DREAM QUARTER
Doubleday; Collection
December; \$5.95

With this final collection, Malzberg bids farewell to his SF career, which he now regards as thankless. Featured are an Introduction, essays, autobiography, and fiction.

MEREDITH, Richard C.
NO BROTHER, NO FRIEND
Doubleday; novel
November; \$5.95

Derring-do (and Don't) in alternate dimensions, somewhat in the manner of Keith Laumer's Imperium series, this new adventure is a direct continuation of the author's earlier *At The Narrow Passage* which was notable for its cliffhanger of a non-conclusion. "Hiding in one of Earth's parallel worlds, two fugitives from the Time-liners work to foil the lizard-like Triths who may or may not be telling the truth

about the universe's terrible future." The publication of this book was delayed when Doubleday lost contact with Meredith. Concern was expressed as to his whenabouts.

MONTELEONE, Thomas F.
THE TIME CONNECTION
Popular Library; novel
November; \$1.25

Monteleone's first book was literally given away as a free sample of the Laser product. This was neither the best introduction to that publisher or to the author, who is surely capable of better things. Perhaps this novel is one of them? A young couple pass through a timedoor in a cave into a future computerized society.

NIVEN, Larry
A WORLD OUT OF TIME
Holt, Rinehart & Winston; novel
September; \$7.95

From the "Lesly Circuit" series, this eagerly anticipated new novel is certain to figure among the nominees for next year's Hugos and Nebulas awards and marks a new stage in the career of Larry Niven. In effect an expansion and development of his story "Rammer" the novel's next stage was



Creative Computing Magazine

A bi-monthly 88-page magazine for students, hobbyists, and anyone curious about computers. Fiction, articles, humor about computers, cybernetics, careers, building info, etc. Emphasis on games, puzzles, and projects. Contemporary, non-technical approach. Subscription, \$8.00 pp.

Games & Puzzles Issue of Creative Computing

88 pages of games and puzzles for pocket calculators, computers, and humans. "Beating the Game," "Computer Chess," "Hunting a Wumpus in a Cave," building your own computer, reviews of 24 games, books, and much more! \$1.50 pp.

Futures Issue of Creative Computing

Artificial Intelligence (Bertram Raphael, Herbert Dryfus, etc.), Extraterrestrial Intelligence (Isaac Asimov, Martin Harwit, etc.), microprocessors, video discs as an ultimate computer input device, 4 new games, and more. 88 big pages! \$1.50 pp.

Artist and Computer

A high quality, 4-color book edited by Ruth Leavitt which displays the work of 35 internationally-known computer artists. Each artist describes his or her work in non-technical terms. 140 illustrations. \$4.95.

ISN'T IT TIME YOU ORDERED SOME

CREATIVE COMPUTING STUFF!! TODAY!

The Best of Creative Computing

A 328-page book featuring stories by Isaac Asimov and others; articles on cybernetics, robots, computer crime, privacy, computer games such as Star Trek, Rabbit Chase, Magic Square, Madlib, and 14 more; super computer graphics; cartoons, reviews; poetry; and more! \$8.95.

Creative Computing T-Shirt

Albert Einstein portrait produced by Bloccip™ process. Scarlet trim, black design. Available in adult sizes: S, M, L, XL. \$4.00 pp.

Mr. Spock Computer image

Big 17x22" computer scanner image. Heavy stock. Comes in strong mailing tube. \$1.50 pp.

Star Trek People Computer Images

Six 8 1/2 x 11 computer images on heavy stock of Kirk, Spock, McCoy, Scott, Chekov, and Uhura. \$1.50 pp.

Star Fleet Technical Manual

Articles of Federation, Flags, Uniforms, Navigational Charts, Schematics of Star Fleet equipment, etc. \$6.95.

Please send me the following:

Item	Price
_____	_____
_____	_____
_____	_____
_____	_____

Shipping (books only) \$1.00
All orders outside U.S.A. add \$1.00

Cash, check, M.O. enclosed
 Charge my Bankcard (minimum charge \$15)

BankAmericard Mester Charge

Acct. No. _____

Expiration date. Mo. _____ Yr. _____

Name _____

Address _____

City _____

State _____

Zip _____

**Creative Computing, P.O. Box 789-M,
Morristown, N.J. 07960, U.S.A.**

the story "Down and Out" featured in the February *Galaxy*, which will publish the balance of the story in the September, October and November issues. The last installment will appear, due to unavoidable difficulties, well after the publication of the entire book. Niven's hero, now known as Jerome Branch Corbell (a tribute to a favorite author) is a "corpse". Cryogenically frozen when he contracted cancer in 1970, Corbell awakes to find himself in a new body, which has already been the recipient of several other personalities, now terminated. Like his predecessors, he is obliged by the future totalitarian State to perform a mission of exploration, under the threat of a similar fate, but Corbell manages to steal the spaceship he has been assigned (in reality a prison cell) and flees, heading out at near-light-speed for the galactic core. His only companion is the ship's computer, imprinted with a personality fanatically devoted to the State. It is his hope to utilize the laws of relative space-time to his own advantage by outlasting his criminal status. In this he is successful beyond his wildest expectations when he (and the computer) discover a black hole at the core. Their approach to this cosmic event results in their being transported three million years into the future. When, at last, they return to a "puzzlingly transformed, relocated solar system" they and the reader are due for a series of stunning surprises. Niven is well known in the field for his blend of up-to-the-minute scientific authority and vividly imagined speculation. This book seems only likely to increase his reputation.

PISERCHIA, Doris
A BILLION DAYS OF EARTH
Bantam; novel
November; \$1.50

"... About a far future time when people—no longer human—share the earth with other intelligent species descended from today's animal world. . . ." This would seem to be a popular theme (see Crowley's *Beasts*, also Neal Barrett's Aldair series and Brian Stableford's new *Realms of Tartarus* trilogy (as yet published only in Britain). Pischerchia is the author of *Star Rider* and *Mr. Justice*.

POHL, Frederik
MAN PLUS
Random House; novel
August; \$7.95
SF Book Club; October

74. GALILEO

A manned mission to Mars seems to be what is needed to avert otherwise inevitable global catastrophe. The astronaut who will be sent on this vital mission has been transformed through surgery into a being capable of unaided survival on the red planet—in other words, a Martian. What happens to an average domestic American (he doesn't know that his wife is unfaithful) when he leaves the Earth behind, and with it, perhaps, his humanity? Pohl's tone is sardonic, almost bitter, his story pointed, uncomfortable.

GATEWAY
St. Martin's Press; novel
January; \$7.95
Galaxy; Nov-Dec.

The working title for Frederik Pohl's second novel of the year was "Beyond the Blue Event Horizon". Originally scheduled for September, publication of the book has been delayed so that the serial version can be completed. In the St. Martin's Press catalogue one may read: "The Heechee gateways (artifacts of a long-dead superior civilization) are the means for instantaneous transportation to distant parts of the universe, but the traveller can never be sure where he will go or whether he will come back. A successful journey can bring immense wealth, but death is all too often the only reward." Hmm. Sounds like an altogether different kind of story from *Man Plus*.

ROBINETT, Stephen
STARGATE
St. Martin's Press; novel
September; \$7.95

Until quite recently, Robinett wrote as 'Tak Hallus' (Arabic for 'pseudonym') the name under which his first story appeared in 1969. This novel, his first, an Analog serial published in 1974, concerns rival corporate space mining enterprises which routinely utilize matter-transmitting devices. Our young hero, a Project Engineer, has to help foil a ruthless takeover scheme.

ROBINSON, Spider
TELEMPATH
Berkley/Putnam; novel
December; price?

Spider (does he have another name?) Robinson was the second writer to win the John W. Campbell Award. He is the well liked author of the pub filled Calahan's Bar stories (soon to be collected

by Tempo). He lives in Nova Scotia, from which remove he sends in regular book reviews to *Galaxy*.

SILVERBERG, Robert
SHADRACH IN THE FURNACE
Bobbs Merrill; novel; Oct.; \$8.95
Analog; Aug., Sept., Oct.

He is known as 'Genghis II Mao IV Khan, Prince of Princes and Chairman of Chairmen—which is to say, ruler of the earth' and he is the ultimate dictator. "The game of politics is ended." The world ruled by 'Genghis: Mao is dying, ridden with vile new disease spawned by bacteriological warfare and for the most part, survival is more important than freedom. Mao, too, is dying, but he has interesting plans for the future. There have been despots before but, ultimately, they were only flesh and blood. Now there are new techniques. The care of the Chairman is entrusted to Dr. Shadrach Mordecai, a black man born in Philadelphia. It is his duty to keep the personification of power alive for as long as possible. But when his own life is threatened, to what lengths will he go towards that endless end? It is Silverberg's wish that this book be labeled only as 'A Novel' in hopes, perhaps, of reaching a wider audience than, say, the readers of Analog. Perhaps, or perhaps those outside the field will see it as merely a clever parable on the nature of good and evil, absolute power and human frailty—eternal subjects.

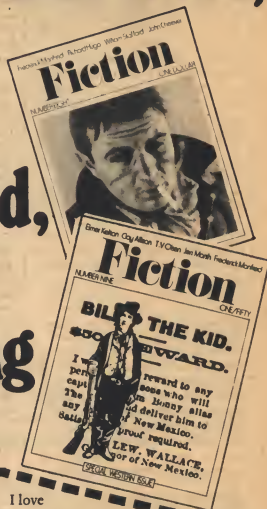
SMITH, George H.
The SECOND WAR OF THE WORLDS
Daw; novel
October; \$1.25

It would seem that there is more to the story of the great interplanetary conflict than was told by H.G. Wells. "The Martians invade again (in 1904) only this time they hit Earth's parallel counterpart—where the laws of science are different!"

SNYDER, Gene & WATKINS, W.J.
The LITANY OF SH'REEV
Doubleday; novel
December; \$5.95

A second collaboration by these two newer authors, this is an unusual treatment of a religious theme. An alien being successfully achieves the highest level of (Buddhist) enlightenment.

The greatest invention
 since the paperback book,
 ...but cheaper.
 For the person
 who loves to read,
 this magazine
 offers everything
 but the facts...
 Science fiction,
 mystery, satire,
 western, love,
 and adventure.



I love
 a good story!
 Start the subscription

I have checked. Payment is
 enclosed to avoid billing costs.
 The balance will be refunded if
 I'm ever dissatisfied.

6 issues only \$6 (\$3 off)
 12 issues only \$10 (\$8 off)

Name: _____
 Street: _____
 Town: _____
 State: _____ Zip: _____
 GALILEO
 339 Newbury St., Boston MA 02115

POSTER SHOP



CONFLICT



MAN AND WOMAN



WAR



OVERPOPULATION



THE
PITRE COLLECTION

A NEW DAWN

A Great Artist In Our Time

John Pitre is creating the kind of work seldom seen today, an artist who combines the genius of aesthetic conception with supreme craftsmanship.

Magnificent Full Color

Huge 25 X 35 inches

These beautiful color reproductions are available here at unbelievably low prices. Only \$3 each. Order two for \$5 or all five for \$10.

Please send me the following posters. Only \$3 each. Two for \$5. Three for \$7. Four for \$9. All five for only \$10. My payment is enclosed.

- A NEW DAWN
- CONFLICT
- WAR
- OVERPOPULATION
- MAN AND WOMAN

Name: _____

Street: _____

City: _____

State: _____

Zip: _____

Send to: AVENUE VICTOR HUGO
339 Newbury St., Boston, MA 02115

STABLEFORD, Brian M.

THE FLORIANI

Daw; novel
September; \$1.25

The first of a new series by the author of the popular Grainger/Hooded Swan novels, about the adventures of the 'recontact ship' *Daedalus*. On her maiden planetfall, the crew encounter a 'biological surprise.' The second book in the series, *Critical Threshold*, will be published in February.

STARR, Bill

The TREASURE of WONDER-WHAT

Ballantine; novel
December; \$1.50

(From the Farstar & Son series, number two.) Dawnboy MacCochise and his father, Ranger, have three reasons for coming to the planet Newtonia. Most important of these is to finance an expedition to search for a legendary lost spaceship, her cargo laden with gold and jewels, carried off by an erratic comet centuries before. The trouble is, several other people have the same idea.

STRUGATSKI, Arkadi & Boris

The FINAL CIRCLE of PARADISE

Daw; novel
November; \$1.25

Translated from the Russian by Leonid Renen, this is only the second novel by the prolific Soviet brothers to appear in this country, after the interesting *Hard To Be A God*, (Seabury/Daw). The better known *Snail On The Slope* should soon be forthcoming from from Bantam, however.

TUBBS, E. C.

SPECTRUM of A FORGOTTEN SUN

Daw; novel
November; \$1.25

Unlike most multi-volume series, the Dumarest books actually have some dramatic progression from episode to episode. . . Dumarest goes from planet to planet in search of lost Earth, pursued by an unpleasant entity known as the Cyclan. Whether author or readers will ever grow tired enough of his peregrinations to let him come home at last is still an open question.

VANCE, Jack

MASKE: TAERY

Drew Whyte

Berkley/Putnam

October; \$7.95

Vance has a niche all his own among the best of today's SF and fantasy writers. For example, he writes elegant entertainments of nefarious doings on far-off worlds, tales full of colorful background detail and curious incidents. He specializes in the depiction of highly structured societies, often with ornately ritualized customs that evoke but never duplicate their counterparts in Earth's historical past. As a result, his plots tend to be atypical SF. They are apt to employ conventions more likely to be encountered in the pages of Dickens or Georgette Heyer or the Lady Murasaki. This new novel, which does not seem to form part of an existing series, is set on the planet Maske. Young Jubal Droad, (possibly estranged?) scion of a famous commercial family, sets out for the City to make his fortune, where he joins a rival house in the capacity of industrial spy. His actions incur the enmity of Ramus, a respectable figure whom Jubal is able to prove is engaged in "forbidden interplanetary dealings". The conflict is only resolved by several trips off-planet during the course of which he encounters "a strange people who worship intelligent trees."

WALLACE, Ian

The WORLD ASUNDER

Daw; novel
November; \$1.50

Ian Wallace, whose real identity is a well-kept secret (allegedly a practicing psychiatrist) is an author with a select and growing readership. This new novel by the creator of the convoluted Croy/Pan Sagittarius sequence features a "... conflict between time epochs, the struggle of demigods, the ultimate super weapon and the strangest peace-keeping organization ever devised!" "All that," it says, "plus a moving novel of human relations." End quote.

WATKINS, William Jon—see SNYDER

WHITE, Ted & WOLFMAN, Martin

DOC PHOENIX

Pyramid; novel
December; \$1.50

(Weird Heroes number 5). The concept of Byron Preiss in this series was to create a new pantheon of heroes for our time in the tradition of the pulp superheroes of the thirties. Ted White, the editor of *Amazing and Fantastic*,

who has had a long association with all aspects of popular culture, was asked to develop a contemporary incarnation of Doc Savage. Dr. Raymond Phoenix, "The Man Who Enters the Mind" made his debut late last year in the pages of *Weird Heroes*, volume II. Ted White admits his other chief inspiration was the character of Rief in Roger Zelazny's *He Who Shapes* (also known as *The Dream Master*). Like Rief (and, come to think of it, the protagonist of John Brunner's *The Whole Man*) Dr. P. cures mental illness by projecting himself into his patient's psychic landscape and therein confronting whatever monsters of the id may there reside. Like Savage, he is surrounded by a crew of constantly bickering but steadfast special assistants. I don't know what Martin Wolfman's contribution to this book is or whether it will have more of the handsome illustrations by Steve Fabian that graced the original story.

ADDITIONS

CARR, Terry

The LIGHT at the END of the UNIVERSE

Pyramid; collection
Oct.; \$1.25
'A Harlan Ellison Rediscovery'

KNIGHT, Damon

The BEST of DAMON KNIGHT

Pocket Books; collection
September; \$1.95
Previous book club edition

LEIBER, Fritz

The WORLDS of FRITZ LEIBER

Ace; collection
November; \$1.95

New—previously not in print from Ace in any form—book.

POWERS, Timothy

EPITAPH IN RUST

Laser; novel
November; \$1.25

FLASH!

Avon Books Editor Bill Van Assen has just acquired *Mindbridge* for the somewhat surprising figure of \$100,000. "It's a marvelous book!" he says. "I think we're going to sell a lot of copies."



Inquisition

Letters

The man whose name has been taken by one of our first correspondents. A warning?



Dear Mr. Ryan:

Apparently because I changed residence, I did not get your earlier letter, so that your news of a new magazine is brand new to me. I congratulate you and wish you well.

Late this summer I plan to retire and devote my entire time to science fiction. Science fiction originated in the magazines and has been dependent on the magazines for many years and I do think that the science fiction community should do all it can to support them. I regret that the last few years, because of book pressure, I have been able to do little....hope to do more in the years ahead.

Clifford D. Simak
Mound, MN

Dear Charlie:

Why didn't you choose something simple to do, like finding a cure for cancer or unifying Africa? No, you had to go and try to found a new science-fiction magazine. I hope you know what you and your associates are getting into.

I like the layout of *Fiction* very much. The cover photo is very effective, as well as being a money-saver

for something like *Galileo*. Black & white in the hands of a good art director can often have more impact than color, especially when surrounded by lavishly-hued magazines.

I also think a *Fiction*-size format would be a tremendous aid. One of the problems (I'm told) with digest-size SF magazines is that they get lost on newsstands. . .they're too small to fit properly with, say, *Scientific American*, yet too large to slide into the slots designed for paperback books. And I think your title is excellent.

But I think the crucial need is for advertising. . .general advertising, like advanced stereos, or 'quasar' TV, and so on. This is the vital ingredient every modern SF magazine lacks. No one makes proper use of the statistics which show what a valuable specialized market SF provides (younger, affluent, educated. . .nobody at any of the SF mags knows advertising demographics, it seems).

Meantime, best of luck. Hope to meet you at the WORLDCON in KC.

Alan Dean Foster
Santa Monica, CA

Dear Mr. McCaffrey:

Best of luck to you on *Galileo*. I'm very interested in the project and will certainly subscribe before the end of summer. A good, quality, magazine-size SF publication is sorely needed.

I have of course my own ideas on what such a magazine should be like, and if I lived in Boston you'd probably be subjected to them regularly. Fortunately for you, I'll allow you to go your own way. My major point would concern the non-fiction: don't limit yourself to *Analog*-style aerospace articles. Biology and psychology are extremely important to our future, and in my magazine I would probably emphasize those. Basically the main virtue of SF as I see it is that it makes people think—it makes it more pleasurable to think than not to—and *Galileo* should keep that in mind.

Jeff Smith
Baltimore

Dear Pagans:

You have seen fit to burden this world with visions of the next, so it is my duty to over-C your efforts. . . I hear you've weaseled work out of a

Letters

few of the *Illuminatus*. (I should note that we were not asked—a dereliction which will be remembered). Mr. Bradbury, the non-science fiction readers' science fiction writer should legitimize the contents for the New York establishment, but his neglect of his talent in not producing a major work for so long raises some question. Mr. Clarke is difficult to ignore, even at the great distance he keeps himself from his audience (perhaps he doesn't like them.)

I rather expect you to fail. SF fans tend to be (with some exceptions such as myself) rather tasteless in their tastes; listening only to themselves, they are convinced that their chosen realm is something special; conversing in shop talk, their jargon alienates them from all but aliens—a species, it would seem, which associates only with red-neck farmers. (Perhaps they would do better to dress in overalls.) These people will not appreciate your efforts if they are good, and if your aim is lower, you will be rejected as yet another used-car salesman attempting to rip off the fans. . . (by the way, I have a cousin in Naples who has a good deal on previously owned Fiats).

Which brings me to my final point.

I appreciate your naming the product after a fellow Italian, but why him? Da Vinci was surely a greater mind, Michelangelo a finer artist (and poet!). And then there is Copernicus of that great Catholic nation to the north, or the visionary Frenchman Jules Verne, or . . . but why the heretic? Is there some significance?

My Wholly Excellence,
Pope Urban VIII
Peoria, IL

Weston—cont. from page 69

writers have consistently failed to understand the basic technical and economic problems of their introduction? That poor stories abound in which the robot plays the role of a convenient spear-carrier in naive wish-fulfillment in one of mankind's oldest dreams?

And yet there is immense potential here. The full awesome implications of artificial intelligence have taxed the imaginations of some of science fiction's top storytellers. Maybe the really great robot stories still remain to be written?



Editorial—cont. from page 8

helped so much: Ray Bradbury, Arthur C. Clarke, Hal Clement, Alan Dean Foster, Carl Sagan, Jacqueline Lichtenberg, Brian Aldiss, Damien Broderick, and Kevin O'Donnell Jr., Karl Hansen, Robert Chilson, Tom Barber, Wendy Pini, Doug Smith, Pat Warrick, John King, Ron Miller, and all the many others whose generosity has helped us at the start.

To Carmen F. Zollo, American distributor of Ingmar Bergman's *The Magic Flute*, the French film *The Old Gun*, and producer of the present Broadway hit production of *Guys and Dolls*. Without the help of Mr. Zollo and his son, Frederick, the dream of GALILEO could never have become a physical reality.

Someday, I hope the list is endless. All of those mentioned, and the many others space will not allow, share our belief that Science Fiction is an art form, literature, and most important of all, that it should entertain.



Telescope

Issue number two of GALILEO features noted author Hal Clement who plunges into the heated core of the nuclear reactor controversy with some cold facts. Famed astrophysicist Carl Sagan, fresh from his efforts with the successful Viking Project, explains the politically delicate procedure used to nametag portions of the solar system. Alan Dean Foster combines novel ingredients in a moving tale about a thug who crash lands in an uncharted forest. Jacqueline Lichtenberg, who burst into the limelight with *Star Trek Lives!* and *House of Zeor*, explores the love-hate relationship between a human and the alien he is compelled to save. Plus, other stories, regular features by Peter Weston and Drew Whyte, and a few other surprises. Don't miss it, or Issue number three with Brian Aldiss, Gordon Eklund, Kevin O'Donnell, Jr., and Robert Chilson. SUBSCRIBE!

Classified

**A Small Business Marketplace,
A Meeting Place of like Minds,
A trader's Paradise.**

**Only 10 cents per word
with a 10 word minimum.**

BOOKS

OUT-OF-PRINT paperbacks. Many scarce titles and authors in stock. Send long SASE for free list. Loompanics, Box 264, Mason, Michigan 48854

SF and Fantasy Books (new and used); paperbacks, pulps. Catalog 50 cents. Collections also purchased. R.A. Madle, 4406 Beator Drive, Rockville, MD 20853

BOOKS READERS & COLLECTORS! Send title and author of books wanted to: S & S Books, 80 North Wilder, GL-1, St. Paul, MN 55104

BROTHER EARTH - Vaseleo Garson. "Ay, Mother Moon was very unhappy when some of her children were taken, so she hurled fire at Brother Earth. And Mother Moon herself to reach Brother Earth and came very close, but reached only so far to her the lonely cries of the stolen children. Hearing those piteous cries, Mother Moon sent the rest of her Children to Brother Earth, each of them carrying a curse." This was the legend Joe the Wilding must remember as he fled through the jungle—a great, bronzed, black-bearded giant with a furry ball clinging to his back. Hardback \$6.95 Postpaid. Imagination Plus, Box 3126, Rockford, IL 61106

Want to know about the REAL future of Space? Earth/Space News shows the other side. Sample, \$2.00. \$10/year. EARTH/

SPACE, Inc. 4151 Middlefield, Palo Alto, Cal 94303

Read SCI-FI paperbacks, 44 cents each! Free detailed PMLOV- GM 1, Routé 2-290, King, North Carolina, 27021

THE BEST SCIENCE FICTION SELECTION IN BOSTON. Try the Avenue Victor Hugo Bookshop, 339 Newbury Street, for all your reading needs. Personal, friendly, different!

BUSINESS OPPORTUNITIES

Your dreams of low-cost spaceflight will soon become realities. Private ventures are now developing the launch techniques which will make Space economically accessible. You can read of these low-cost techniques and the driving forces behind them—in Earth/Space News. Sample, \$2. \$10/year. EARTH/SPACE, Inc., 4151 Middlefield, Palo Alto, Cal 94303

MISCELLANEOUS

RIFT TROOPERS Brilliant simulation pits mobile infantry against three different alien races. If you like "Starship Troopers" you must buy this game. Triple pack set \$7.99. **FORMALHAUT** II Tactical ship to ship combat for two to 34 players. Giant Fire Glow Steller Display. \$6.99. **STAR RAIDER** Strategic exploration and conquest. \$5.99. Full catalog of S.F. simulations, models, & miniatures (including undead soldiers from Hell!) 50 cents. **ATTACK**; 314 Edgley Ave., Glenside, PA 19038

Simon Jester—revolutionary libertarian stickers. Taxation, anarchy, libertarianism, etc., Palm-size: 2 1/4 x 1 1/4. Average price: 100 /\$4. Free catalog. Simon Jester, Dept. Y, P.O. Box 514, Beaverton, Oregon 97005

REMEMBER RADIO SCIENCE-FICTION?? Original radio broadcasts—records & tapes!! Pohl, Asimov, Bradbury, Heinlein, Sturgeon. Catalogue: \$1.00. Catalogue + full-hour broadcast: \$5.95!! Specify: CASSETTE/ 8-TRACK / REEL/ RECORD. American Radio (G2), Box W, Culver City, CA 90230

SCIENCE FICTION/FANTASY/HORROR/FILM STILL 8X10 B/W. **DAY THE EARTH STOOD STILL**, **INVADERS FROM MARS**, **EARTH VS THE FLYING SAUCERS**, **FORBIDDEN PLANET**, **DESTINATION MOON**, **WHEN WORLDS COLLIDE**, **INVASION OF THE BODY SNATCHERS**, Over 150 Titles. Free Catalog: R.U.R., 2354 Laurel Canyon Blvd., Los Angeles, CA 90046

CARTOONS FOR DISPLAY, 11X17 inches, Satire, to aid in the repeal of laws on Victimless Crimes, Pot, Prostitution, Gambling, Guns, and Jails. Set of 5: \$2. Witke, P.O. Box 331, Oklawana, Fla. 32679

FIRST NEW CALCULUS IN 300 YEARS. Send stamped-addressed envelope. Mathco, Rockport, Mass 01966

EARTH/SPACE is more than just a publication. EARTH/SPACE is a private space enterprise. Our objective is to lower the cost

of getting to and using Space. Every subscription to Earth/Space News brings low-cost Space launch closer to reality.

15 BIG GLOSSY COLOR PALOMAR/NASA POSTERS, 2/\$5, Craig Posters, P.O. Box 593 Downers Grove, Ill. 60515

PUBLICATIONS

If you're truly a Science Fiction Fantasy Buff, You'll want to read "Orbs of Fantasy" Six times a year, just \$6.00. Crystal Orb Publishers, P.O. Box 220, Hooick Falls, N.Y. 12090

Psychology, Humanities, Ethics, etc., Articles on Piaget, Selye, Nozick, psychotherapy, biological (natural) morality, etc., Opinion by Dunn, Klein, Nordwert, Narice, etc., Written by and for Libertarians. **COGNATIONS** (\$5 per year-11 issues), P.O. Box 172 Pelham, N.H. 03076

"LIFE'S MEANING!" Profound philosophical poetry depicting Love, Freedom, Truth, and much, much more! Send \$1.00, T. Johnson, Box 113, Estherville, Iowa 51334

SCIENTIFANTASY Specialist: books, magazines. Free catalog. Gerry de la Ree, Cedarwood, Saddle River, N.J. 07458

MINOTAUR—Poetry, Short Stories, Articles, Market Information. Needs Subscribers. Needs material. Send self addressed stamped envelope for information. 2923 B Rose St., Anchorage, Alaska 99504

Discover why **KNIGHTS** is among the most highly recommended fanzines available. Recent issues have contained articles and letters by Gerry Benford, David Gerrold, C.L. Grant, Barry N. Malzberg, Thomas F. Montelcone, Larry Niven, Jerry Pournelle, and Ted White. \$1.25 or 4/\$4, Mike Bracken, P.O. Box 7157, Dept G, Tacoma, WA 98407

The July issue of Earth/Space News discussed Low-cost Plug Nozzle launch techniques; Nuclear Launch at Less Than \$30/lb; Migma Fusion; Free Cities in Space as a new legal concept; and the success of OTRAG in setting up private launch facilities in Zaire. You may order the July issue for \$2; \$10/year. EARTH/SPACE, Inc., 4151 Middlefield Palo Alto, Cal 94303

PERSONALS

The future of Space will come—not by the well-ordered designs of a few government planners, but by the random designs of tens of thousands of pioneer companies and individuals. Earth/Space News speaks of pioneers and the future of Space which will soon come to be. Sample, \$2. \$10/year. EARTH/SPACE, Inc., 4151 Middlefield, Palo Alto, Cal 94303

If you like **GALILEO**, chances are that the kind of people you should know read and like it as well. Try an ad in our personals section. You may be far out, but you can be as close as 10 cents per word.



Poul
Anderson



Barber